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TROPICAL DISEASES BULLETIN

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Issued under
the Direction of the
Honorary Managing Committee of the
BUREAU OF HYGIENE AND TROPICAL DISEASES,
Keppel Street, London, W.C.1
(Telephone: MUSEUM 3041)

TROPICAL MYCOLOGICAL INSTITUTE
1 MAY 1948

Price 3/6 net] *Entered as Second Class Matter in the U.S.A. Post* Annual Subscription (Jan.-Dec.) 30/-

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BUREAU OF HYGIENE AND TROPICAL DISEASES

TROPICAL DISEASES BULLETIN

Vol. 45] 1948 [No. 3

SUMMARY OF RECENT ABSTRACTS*

III. MALARIA

Epidemiology

STEVENS and BLACKMAN (p. 169) report malaria in two persons, living in Oxford, who had never been out of Britain, and LEVICK and MACGREGOR (p. 789) refer to two cases of malaria in London children, which were probably contracted in Welling and the Isle of Sheppey respectively. FERMONT (p. 874) also records a case of malaria in a patient who had no previous history of malaria and who had lived for some years in England; but she had lived in the tropics until 1937.

VOGT (p. 172) reports a case of malaria apparently contracted in Norway, in which the incubation period was probably 8–9 months. HERNBERG (p. 951) states that *P. vivax* malaria, which had been almost absent from Finland for 20 years, was found in Finnish troops during the recent war, and in civilians. The source was, apparently, the Russian troops, and most cases were related to Karelia. In many cases the incubation period lasted 9 months. The same author (p. 15) discusses the long incubation period (which may be up to one year) observed in the malaria of Finland, basing his opinions on findings during an epidemic in troops in 1944–45.

Indigenous malaria in Vienna has apparently increased in recent years. WENGER (p. 951) attributes this largely to the number of infected persons who have returned from war service.

PUTNAM and HACKETT (p. 15) report on malaria in Sardinia during 1925–34, where *A. maculipennis labranchiae* and *A. sacharovi* are the vectors. The density of anophelines and the prevalence of malaria declined sharply in one area after limited control measures had been instituted in 1925.

ALOSI (p. 155) shows that during the war there was a marked increase of malaria in Sicily, partly because the people were dispersed as a result of bombardment, and partly because new strains of parasites were introduced by the troops.

KOUSSITASSEFF (p. 638) describes the declining incidence of malaria in Bulgaria, where *A. maculipennis*, *A. superpictus* and *A. sacharovi* are the vectors. He ascribes the decline to the antimalaria measures taken, but does not give details.

* The information from which this series of summaries has been compiled is given in the abstracts which have appeared in the *Tropical Diseases Bulletin*, 1947, v. 44. References to the abstracts are given under the names of the authors quoted and the pages on which the abstracts are printed.

BEKLEMISCHEV (p. 639) discusses in detail the possible effects of large-scale migrations of population, or of troops, in relation to malaria, and considers these possibilities in the light of actual happenings in Russia during the war. The abstract should be read in full.

SANJUAN FUENTES (p. 486) discusses malaria in the Tangier Zone, where *P. vivax* is the predominant parasite.

WILSON (p. 952) sums up the malaria experience of the troops in Madagascar, where *P. falciparum* is the common parasite. Malaria is hyperendemic in parts, with high spleen and parasite rates in children. *A. gambiae* is present throughout the island, and is a serious vector, but *A. funestus* is the chief carrier in the higher country.

TURNER and WALTON (p. 640) have compiled a detailed report on malaria in Freetown, where the chief vectors are *A. gambiae* and *A. melas*. Transmission is perennial, with great exacerbation during the rainy season, and mosquitoes are often blown out to ships in harbour, even as far as two miles from the shore. Although the general sanitary level of the town is low, the malaria position has improved since the beginning of the century, and during the war the various precautions taken in military units reduced the risk from a probable rate of 1,000 per 1,000 to 73 per 1,000 per annum. At the present time, *P. falciparum* is the predominant parasite.

SCHWETZ (p. 786) finds that the limit of altitude for endemic malaria in the Belgian Congo is about 1,750 metres above sea level.

MATILLA *et al.* (p. 279) report on the spleen rates found in the island of Fernando Po.

COVELL (p. 797) discusses the whole question of the effect of irrigation on malaria in India. The most dangerous form of irrigation is by perennial canal, and the chief sources of danger arise from general raising of the subsoil water level, seepages and leakages. The solution of this serious problem lies in cooperation between the engineer and the malariologist. RAO and NASSIRUDDIN (p. 16) show how the construction of a dam across a river in Mysore, and of a canal fed from the reservoir thus formed, raised the level of subsoil water practically to ground level, and created conditions in which *A. culicifacies* bred and caused an epidemic of malaria in an area previously fairly healthy, which was followed by conditions of hyperendemicity. An enormous multiplication of snails also took place, with the result that fluke disease of sheep and cattle caused great loss. In part of Madras a large irrigation scheme is proposed, which involves construction of a large dam, and a large lake. In a preliminary survey of the area, RAO *et al.* (p. 952) found endemic malaria in only 68 of 312 villages, but epidemics occur after seasons of abnormal rainfall. *A. culicifacies* is the chief vector, but *A. stephensi* also plays a part.

DE BURCA (p. 953) gives an account of malaria at Fort Sandeman in the north-east of Baluchistan, where *A. culicifacies* and *A. stephensi* are the commonest anophelines. There is evidence that these were caught 3–3½ miles from their breeding places.

HARPER and his colleagues (p. 953) have written a series of comprehensive papers on malaria in the U.S. forces in the South Pacific, where it caused casualties five times as numerous as those due to combat. In the most severe epidemics the incidence was at rates up to 2,678 per 1,000 per annum, but mosquito control and suppression by drugs greatly reduced the incidence. The authors think that *A. farauti* [which they regard as a species rather than a variety of *A. punctulatus*] is probably the only important vector in the South Pacific area; most of the other anophelines, even *A. punctulatus*, are zoophilic in habit. MACKERRAS and ABERDEEN (p. 555) report a malaria survey at Wewak, New Guinea. The vector is *A. punctulatus farauti*, and transmission is probably perennial. Spleen rates and parasite rates and counts are high

in infancy, and fall in childhood, as does the gametocyte count. The picture is one of hyperendemicity with development of immunity. It is likely that infants provide the sole source of infection of anophelines with *P. falciparum*, since the gametocyte counts in older children and adults are probably too low for effective transmission.

WATSON and RICE (p. 35) show that in the Tennessee Valley, negroes suffered less illness from malaria than white persons, but blood examination showed that they had a greater relative number of infections. The negroes lived under similar, or worse, conditions than the white people.

MONTESTRUC (p. 641) reports on malaria (largely due to *P. falciparum*) in Martinique, where it is found only on the south coast, and where the incidence is not heavy. BELLERIVE and DAMBREVILLE (p. 16) discuss malaria in Haiti, where it is an important problem.

BATISTA (p. 875) records malaria (chiefly due to *P. vivax*) as he saw it at a hospital in Amazonas, Brazil.

Aetiology.

In a discussion of the generally accepted nomenclature of the malaria parasites of man, CHRISTOPHERS (p. 158) argues that although these names are incorrect, according to the rules of nomenclature, to alter them would lead to such confusion that the rules should, in this connexion, be suspended. SABROSKY (p. 556) makes a contribution to the question of nomenclature of malaria parasites, which should be read in the original.

In *Federation Proceedings* (p. 400) there is a series of papers on the biochemistry of malaria parasites, in which much of the work done in recent years is summed up. This cannot successfully be condensed.

DAVEY (p. 954) discusses the question of exoerythrocytic schizogony in human malaria; the evidence that it takes place is indirect, but strong. LANZA (p. 160), however, thinks that no satisfactory evidence has yet been found of exoerythrocytic forms of malaria parasites in man, and discusses the various appearances of cells and parasites which are likely to be mistaken for these forms. OBERLÉ (p. 159) describes what he considers to be exoerythrocytic forms of *P. vivax* in man, after infection by inoculation of infective blood in 5 patients with general paralysis. In comment, WENYON refers to the fact that merozoites are extra-cellular, and contain no pigment, for part of their cycle, but that they may be taken up by phagocytes and may even undergo some development in them before being destroyed.

FONSECA *et al.* (p. 487) have studied the infection of chick embryos with *P. gallinaceum*, and the formation of exoerythrocytic stages of the parasite. They have also examined bone-marrow and blood in human infections with *P. vivax* and *P. falciparum*, and they think that there is a reticulo-endothelial phase, preceding the erythrocytic phase, in human as in avian malaria, though they admit that complete proof has not been found. In comment, WENYON gives the opinion that some of the forms described by these authors may be merozoites from erythrocytic schizogony rather than true exoerythrocytic forms.

DUBIN (p. 955) describes bodies which suggested exoerythrocytic forms of *P. vivax* in tissue cultures.

DEANE (p. 17) shows that the chromatin of *P. vivax* and *P. knowlesi* stains well by the Feulgen technique provided that the slide has previously been exposed to alkaline alcohol; she discusses the reason for this.

SHUTE (p. 18) describes the Madagascar strain of *P. vivax* maintained for 22 years in the Horton hospital, and transmitted since 1933 by a strain of *A. maculipennis* raised from a single female.

FERREBEE and GEIMAN (p. 17) have devised a centrifugation method for separating infected from non-infected red blood cells; this depends on mixing

together equal volumes of heparinized infected blood and albumin solution of specific gravity 1071.

FERREBEE *et al.* (p. 17) have conducted a study, by injecting radio-active iron, from which they conclude that *P. vivax* tends to invade young red blood cells. BELTRÁN and SANDOVAL (p. 160) show that merozoites of *P. vivax* exhibit a preference for reticulocytes.

BLACK (p. 18) has cultivated *P. falciparum* and *P. vivax in vitro*, and notes that they grow as well in serum from a malaria patient as in normal serum. He describes the stages observed, noting that cells invaded by *P. falciparum* tend to clump and adhere to any leucocytes present, and that *P. vivax* prefers young red blood cells.

MOSHKOVSKI (p. 956) shows that there is a linear relationship, for *P. vivax* and *P. falciparum*, between temperature and rate of development in the mosquito. The threshold for development of the latter is higher than that of *P. vivax*.

SMOLENSKAJA (p. 875) found *P. falciparum* in various stages of schizogony in venous blood when finger blood, and sternal and spleen puncture material, contained only ring forms. He thinks, therefore, that the peripheral regions of the venous system might represent the normal sites of schizogony of *P. falciparum*.

SOFIYEV (p. 875) has found that the strain of *P. ovale* originally isolated in the Soviet Union, has retained its characteristics during many years of use in the treatment of general paralysis. LISOVA *et al.* (p. 876) have infected various anophelines with this strain, but an editorial comment relating to their work suggests that it may not be true *P. ovale*.

BASU (p. 1030) shows the frequency of distribution of gametocytes of the three common species, in a series of gametocyte carriers in India.

Transmission

Investigating the entry of hungry *A. maculipennis atroparvus* into human or animal houses, VAN THIEL and WEURMAN (p. 557) conclude that atmospheric conditions are much less important than the odour of pig or man, in attracting the mosquitoes. They (p. 787) have found experimental evidence to indicate that *A. maculipennis atroparvus* is attracted by CO_2 in the atmosphere, up to a concentration of 10 per cent.

ETHERINGTON *et al.* (p. 163) quote evidence which indicates that *A. hyrcanus* and *A. maculipennis messeae*, usually considered to be of no malaria importance in Italy, do, in fact, transmit in part of the Po valley. It seems probable that these mosquitoes picked up infection from patients with general paralysis treated by malaria therapy in a hospital in which mosquito screening had fallen into disrepair.

ULITCHEVA (p. 162) shows that in Uzbekistan the breeding of anophelines takes place chiefly in swamps during spring, and chiefly in rice-fields during summer. PLETNEV (p. 957) names the anophelines found in southern Kazakhstan, where malaria is common, and VEL'TISHCHEV (p. 957) those found near Kazalinsk in the same area. Breeding places are described by both these authors. IVANOVA (p. 488) points out that anopheline larvae are capable of crawling over moist surfaces when escaping from a drying pool in search of water. He has studied their reactions to light under these circumstances. USTINOV (p. 491) has studied the gonotrophic cycles of *A. maculipennis* in the Caucasus; details should be sought in the original abstract.

UNGUREANU (p. 557) describes certain morphological features of females of *A. maculipennis*, which greatly assist in the differentiation of adults of the various races. AKALIN (p. 163) reports morphological anomalies in male genitalia of *A. maculipennis*.

ETHERINGTON and SELLICK (p. 19) record their observations on *A. sacharovi* in Persia and Iraq, where it is commonly associated with spleen rates between 60 and 100 per cent. *A. superpictus* and *A. maculipennis maculipennis* are also found.

USTINOV (p. 490) points out that *A. claviger* (*bifurcatus*) is the commonest mosquito on the Black Sea coast of the Caucasus, and that its larvae develop through the winter, reaching stage IV by March.

KRIVONOSOVA (p. 161) and IVANOVA (p. 161) discuss the breeding of *A. plumbeus* in tree-holes.

In a comprehensive report, TREDRE (p. 488) describes the breeding habits of *A. melas* in the *Paspalum* grass and *Avicennia* mangrove areas of tidal marshes in the neighbourhood of Freetown, Sierra Leone. Breeding is maximal soon after the onset of the rains, but as these become heavy, the rate declines, to rise again as the rains diminish. Infection has been found in up to 4·7 per cent. The author discusses identification by characters of the adult and of the egg. THOMSON (p. 795) gives an account of *A. melas* and *A. gambiae* in West Africa. In transmission the latter is nearly three times as effective as *A. melas*, and together, these mosquitoes form a very formidable partnership. *A. melas* breeds in *Avicennia* mangrove near Freetown, but round Lagos and in the Gold Coast it is associated with the great stretches of *Paspalum* grass in the inter-tidal zone; it makes use of fresh water only to a negligible extent, and is therefore confined to the area below high spring-tide mark. THOMSON (p. 795) comments on the breeding habits of *A. gambiae* in West Africa, which are not understood. It breeds in streams and in some pools and puddles, but by no means all, and the conditions which render one pool suitable and another not, are not clear. *A. gambiae* remains the most dangerous malaria vector in the world.

JEPSON *et al.* (p. 1030) describe the habits of *A. funestus* and *A. gambiae*, the two vectors of malaria in Mauritius; the former is the more important, because it can breed in colder conditions, and throughout the year, whereas *A. gambiae* is restricted to the hot wet season. *A. gambiae* tolerates a high degree of salinity along the coast, but the true *A. melas* has not been found there. *A. funestus* does not tolerate more than a trace of salt. The effect of shade is to reduce breeding of *A. funestus*, but this is probably due to reduction of temperature rather than to the effect of light.

VINCKE (p. 163) found a sporozoite index of 7 per cent. in *A. dureni* caught in the Belgian Congo. This mosquito was not found in houses or stables, but formed a high proportion of the anophelines caught in the open.

WOLFS (p. 164) describes 9 species of *Anopheles* caught near Coquilhatville, of which *A. moucheti* is probably the most important local vector; endemic malaria is relatively light in this area.

Senior WHITE (p. 787) discusses the outside resting places of certain Indian anophelines; it seems that a high proportion are to be found outside at a period of the gonotrophic cycle when it is usually assumed that they are at their feeding sites, and therefore susceptible to spray-killing with pyrethrum insecticide. The same author (p. 797) sums up the relationship between ricefields and the breeding of *Anopheles* in India. Where *A. annularis* is the vector, all ricefields are dangerous; for *A. culicifacies* the danger period is until the plant is 12 inches high; for the *A. fluviatilis* group, all non-seepage ricefields are harmless, but seeping ricefields are very dangerous. Fallow fields are also very dangerous in relation to *A. culicifacies* and the *A. fluviatilis* group.

RAJINDAR PAL (p. 19) shows that in Delhi the optimum conditions for *A. culicifacies* are temperature of 25°–30°C., and relative humidity from 60 to 80 per cent. This species does not hibernate or aestivate and is not here a habitual feeder on man; it does not usually fly more than half a mile from its

breeding place. No morphological differences could be found between specimens caught in areas where *A. culicifacies* is, and those where it is not, a vector.

Senior WHITE and RAO (p. 491) show that *A. annularis*, widely spread throughout the East, but usually not of much malaria importance, is the chief vector in the plains of Orissa, where it finds favourable breeding conditions in village tanks with a heavy growth of aquatic vegetation, and in ricefields during the rains. It can be controlled by attention to the tanks. *A. sundaicus* breeds in salty waters on the low-lying coast, and is a more dangerous vector than *A. annularis*.

VISWANATHAN (p. 391) describes the relationship between seasonal rainfall, irrigation systems, and the breeding of *A. fluviatilis* in part of Bombay; this mosquito is responsible for transmission in the rice and sugar-cane areas. *A. fluviatilis* was the only species found infected in one area of the Southern Central Provinces of India by Senior WHITE (p. 958).

Senior WHITE *et al.* (p. 37) show that *A. fluviatilis*, *A. varuna* and *A. minimus*, are the chief vectors of malaria in the Jeypore Hills, and have calculated the anthropophilic indices of these and others. They found also that a high proportion of some species survived more than 12 days in the cold weather.

SIDDONS (p. 693) discusses the transmission of malaria by *A. stephensi* in Calcutta, where this species formed 87 per cent. of *Anopheles* caught in houses, and where its total infection rate was 0·85 per cent.

From an analysis of the results of a large trapping experiment in Burma, YOFE and FOX (p. 160) conclude that *A. minimus* is attracted by man, and hardly at all by animals, whereas *A. aconitus* and *A. philippinensis* are almost entirely animal feeders.

Until recently, it had been assumed that the vector of malaria in North Borneo was *A. maculatus*, but an investigation made by MCARTHUR (p. 788) showed that this assumption could not explain the peculiar distribution of the disease. By careful research, the author was led to suspect *A. leucosphyrus*, and this was, in fact, the only anopheline found infected in the area surveyed, although many other species were present. *A. leucosphyrus* breeds in clear seepages under dense jungle shade, and the female visits houses after midnight, and departs after feeding, without resting. Control by partial clearing of the jungle, to admit light, gives promise of success.

PERRY (p. 391) reports careful studies of *A. punctulatus farauti*, the chief vector in the New Hebrides and Solomon Islands. It breeds in many kinds of water, always open to the sun; eggs may be laid on mud, and they and the larvae and pupae can withstand partial drying. Details should be sought in the original.

MACKERRAS (p. 642) gives a list of Australasian vectors. The dangerous vectors are *A. punctulatus punctulatus* and *A. p. farauti* [the latter being regarded as a race of *A. punctulatus*]. For the list of potential vectors and those of unknown importance the abstract should be consulted.

YOUNG *et al.* (pp. 275, 492) have shown that several North American anophelines including *A. quadrimaculatus* are able to transmit *P. vivax* from various other parts of the world. YOUNG and BURGESS (p. 694) have succeeded in transmitting *P. malariae* by *A. maculipennis freeborni*.

A list of anophelines caught during a special survey in Canada is given by TWINN (p. 694); the known vectors, *A. quadrimaculatus* and *A. maculipennis freeborni*, were found in various provinces.

AITKEN (p. 693) has given a full account of the anopheline fauna of weste n America, but this cannot be condensed.

PENFOUND *et al.* (p. 21) have studied the close relationship between the amount of aquatic or semi-aquatic vegetation and the breeding of *A. quadrimaculatus*. Methods of water management suitable for the control of over 100 plants are

discussed, the most difficult being the alligator weed, which produces a floating mat, and which needs larvicidal oil. The flowering of certain plants gives a readily recognizable indication of the beginning of the anopheline breeding season. GARTRELL and ORGAIN (p. 20) note that *A. quadrimaculatus* tended to disperse relatively far from a reservoir on the Tennessee in which it was breeding prolifically. BROOKE and PROSKE (p. 22) have prepared a serum by intraperitoneal injection of macerated pupae of *A. quadrimaculatus* into a rabbit. A precipitin test with this serum may be of value in the study of natural enemies of mosquitoes. HUNT and DAVEY (p. 694) describe in detail their method of maintaining a colony of *A. quadrimaculatus*.

SABROSKY *et al.* (p. 392) report infection in 3·38 per cent. of *A. crucians* in S. Carolina; this mosquito is usually considered of relatively slight importance. It feeds actively in November, when *A. quadrimaculatus* is hibernating.

FITZGERALD (p. 274) reports on malaria in a U.S. naval base in Cuba, where *A. albimanus* is the vector.

VARGAS (p. 959) reports *A. darlingi* in part of Mexico in which it had not previously been found.

In a study of Brazilian anophelines, DEANE, CAUSEY and DEANE (p. 20) have shown that the most efficient indigenous vector is *A. darlingi*, and that *A. aquasalis* becomes important if very numerous. *A. albitarsis* (which may include a number of species) and *A. pessoai* are of secondary importance. *A. gambiae*, before it was eradicated, was the most dangerous carrier. Morphological information, and keys, are included in the original papers. PAYNE and SANCHES (p. 692) note that *A. darlingi* is the most important vector in the remote areas of Brazil, and FLOCH (p. 486) that it is the most important vector in French Guiana, where the maximum incidence occurs in the dry season, and where most of the cases are due to *P. falciparum*.

SCHIAVI (p. 165) shows that *A. albitarsis domesticus* is the commonest anopheline, and probably the most important vector, at Iguape, on the coast of Brazil, where endemic malaria is severe.

CASTILLO (p. 276) notes that in Ecuador *A. albimanus*, *A. darlingi* and *A. pseduopunctipennis rivadeneirai* are important vectors.

HACKETT (p. 276) shows that *A. pseudopunctipennis*, which is responsible for much malaria in the Andes, exists up to altitudes of 2,600 metres; he notes that it is probably not a homogeneous species, but consists of several varieties.

RACHOU (p. 165) reports on the habits of anophelines of the sub-genus *Kerteszia* in part of Brazil, where they show a strong tendency to invade houses. RACHOU and FERREIRA (p. 1032) have studied the anophelines (of the sub-genus *Kerteszia*) which breed in bromeliads, in southern Brazil. RACHOU (p. 1032) has found infection in *A. cruzi*, *A. bellator* and (probably) *A. homunculus*, of this group.

Pathology: Clinical Findings

In a comprehensive discussion of the cellular basis for immunity in malaria, TALIAFERRO (p. 493) describes the fixed and free macrophages, noting that one effect of acquired immunity is an increased rate of phagocytosis; the local increase in the macrophages is probably a reflection of natural immunity. He discusses the proliferation of various tissues which occurs in malaria. This paper cannot satisfactorily be abstracted.

SPITZ (p. 1032) describes the post mortem findings in *P. falciparum* malaria. She makes the point that in the brain lesions the vessels are rather distended than obstructed by parasitized erythrocytes, though thrombi are occasionally found in vessels associated with haemorrhage. She describes and discusses the findings in the kidneys, but for this the original should be consulted. In discussing the heart lesions observed in fatal *P. falciparum* malaria, MERKEL

(p. 172) comments on the fact that parasitized red cells adhere to capillary walls, and that endothelial cells are swollen. The result must be anoxaemia, and, in fact, the lesions resemble infarcts, for the coronary collateral circulation is poor. Anoxaemia of the heart may be as important as occlusion of cerebral vessels.

A description of the cytology of bone marrow in malaria is given by LANZA (p. 168). A study of the blood and bone marrow, as affected by malaria, is reported by MUKHATCHEVA (p. 494), but details should be sought in the original abstract.

BELTRÁN and DÁVALOS (p. 960) show that examination of fresh blood is efficient for demonstration of malaria parasites as an emergency measure, if staining is impossible.

In discussing splenic indices, GÓMEZ MARCANO (p. 390) makes certain suggestions on matters of detail, which are important. These should be sought in the original abstract.

DELL and KLINEFELTER (p. 171) discuss their radiological studies on spleen size, but their findings should be sought in the original.

TORODE (p. 278) and PULLEN (p. 790) report cases of spontaneous rupture of enlarged spleen in malaria.

ZERMATI and VARGUES (p. 959) have found, as others have found, that the complement titre falls during the course of malaria (as in other infections) and rises after cure. In severe cases, persistent absence of complement indicates the probability of a fatal ending; progressive rise in titre precedes cure. This is a non-specific phenomenon, more marked in *P. falciparum* than in *P. vivax* infections.

MAYER and HEIDELBERGER (p. 172) have studied the complement-fixation reaction in malaria, using for the purpose antigens from various plasmodia. For latent malaria the test has only limited value, but if syphilis is excluded, a positive reaction is specific for malaria. It seems that the malaria antigens contain a Wassermann antigen which is distinct from them. GORDON *et al.* (p. 173) report that a complement-fixation test with an antigen from *P. gallinaceum* is not of much value in detecting latent malaria.

MELENEY (p. 492) sums up part of the literature dealing with the changes in physiological processes resulting from malaria. He deals, for instance, with blood proteins, blood sugar, blood electrolytes, and anaemia. For details the original should be consulted. GALL and STEINBERG (p. 876) show that in malaria and in artificial fever there is a fall in serum inorganic phosphorus, and a rise in blood glucose; they discuss the implications of these and related findings.

BIANCO *et al.* (p. 1034) as a result of observations made on 1,500 attacks of malaria in U.S. naval men, make the point that a large proportion of them gave positive reactions with most of the ordinary tests for syphilis, but the tests usually became negative within 4 weeks.

TRIMARCHI (p. 168) reports that Ascoli's adrenaline treatment restores the fixing capacity of the reticulo-endothelial system to normal in malaria, as shown by the results of the Congo red test.

CARLSON *et al.* (p. 174) describe a colorimetric test which may be significant in diagnosis, though it is probably not specific.

MAKARI (p. 279) finds fairly good correlation between the cephalin-cholesterol flocculation test and spleen and liver enlargement in malaria, and that the shorter the infection, the stronger the reaction.

MACHELLA *et al.* (p. 557) report a relationship between retention of injected bromsulphthalein and the intensity of malarial fever.

LIPPINCOTT *et al.* (p. 166) have investigated liver function in patients with induced *P. vivax* malaria, and conclude that although there is some dysfunction

during the attack, this passes off when effective treatment is given. Somewhat similar findings are also reported by GLENN *et al.* (p. 167). Having performed liver function tests on a series of patients with *P. vivax* malaria, SCHNEIDER and SHALLENBERGER (p. 1033) conclude that although there is some evidence of transitory liver damage in a proportion of patients, permanent damage is rare.

BUTLER and SAPERO (p. 1034) show that American Negroes were as susceptible as white troops to malaria on an island in the South Pacific.

LAMBILLON (p. 1034) describes patients with lesions resembling erysipelas, apparently resulting from malaria.

SPRAGUE (p. 25) thinks that the possibility of cardiac damage from recurrent malaria is extremely remote.

KARK (p. 170) gives reasons for thinking that the risk of activating latent malaria by surgical operations has been somewhat over-emphasized.

DA COSTA (p. 558) enters the warning that patients with fever of malarial type, who do not respond to anti-malaria treatment, should be examined for tuberculosis.

SHUTE (p. 169) defines latent *P. vivax* malaria as an attack in a patient who has been infected several months before the onset of symptoms. The delay may be due to drug suppression, immunity, or infection with two species, or it may be related to the number of sporozoites inoculated, since it occurs only with small numbers. Relapses, on the other hand, are due to activity of the parasites after a resting phase.

From an analysis of the records of malaria in Samarkand, GEVORKOV (p. 486) concludes that during the first half of the year 5–12 per cent. of the cases are primary infections with long incubation periods.

BELTRÁN and SANDOVAL (p. 961) have found that when malaria is induced by injection of infected compatible blood, the incubation period lasts only 1–3 days, but that with incompatible blood it is never less than 5. KAPLAN *et al.* (p. 281) give advice (which should be sought in the original) as to the best dosage of blood containing *P. vivax*, for the induction of therapeutic malaria. KAPLAN *et al.* (p. 25) have shown that men infected with *P. vivax* in the Pacific show considerable immunity if re-inoculated with similar strains for the treatment of neurosyphilis, but that with heterologous strains, satisfactory courses of treatment can be given. ENGSTROM *et al.* (p. 961) report on patients treated in America, for neurosyphilis, by induced malaria with strains from the Pacific and the Mediterranean.

CIUCA *et al.* (p. 561) have hyper-immunized patients submitted to malaria therapy, by repeated inoculation of various strains of parasites of the three common species. Tests carried out during 14 years after this procedure indicate that immunity to *P. malariae* lasts longest, and may persist after parasites have been eliminated. With *P. vivax* immunity is usually, but not always, associated with persistence of the parasites. *P. falciparum* gives the least immunity, probably because its antigens act for a short time only; nevertheless, a degree of immunity may be detected several years after cessation of activity.

CHRISTIANSON *et al.* (p. 24), show that in a minority of relapses, occurring in the United States, of *P. vivax* malaria contracted in the Pacific or the Mediterranean, the patient may show parasitaemia without fever for a few days; a few of such patients may have gametocytes in the blood, but there is no serious risk of infecting local mosquitoes on a big scale.

KITCHEN and PUTNAM (p. 23) give detailed observations on the character of the paroxysms of mosquito-induced malaria with the McCoy strain of *P. vivax*. These cannot satisfactorily be abstracted further.

In discussing the characteristics of *P. vivax* malaria in children in the Panama Canal Zone, EINHORN (p. 695) remarks that cerebral and algid forms are rare,

and that children respond well to treatment with mepacrine. EINHORN and TOMLINSON (p. 393) show that in children admitted to hospital in the Panama Canal Zone for malaria, more than half had *P. falciparum* infections ; most of the cases were from rural or semi-rural areas.

PERVES (p. 277) has found that congenital *P. falciparum* infections are by no means rare in the French Cameroons, yet clinical manifestations are not observed in infants up to the age of 2 months. Malaria is responsible for much of the high infant mortality.

KEAN and TAYLOR (p. 166) report cases of the algid form of *P. falciparum* malaria, in which the signs of shock (with haemo-concentration) responded to fluid replacement therapy with plasma, blood or intravenous fluids.

HILLS (p. 169) reports 24 cases of malarial jaundice, in 5 of which the infection was with *P. vivax*, and in 19 with *P. falciparum*. This appears to be haemolytic jaundice, and rapid haemolysis may cause haemoglobin to appear in the urine. BIRNBAUM *et al.* (p. 22) show that red cells from patients with malaria are laked in bile solution more easily than normal cells, and that although quinine, atebrin and plasmoquine all accelerate this haemolysis, quinine administered *per os* to normal subjects does not do so.

BECKER *et al.* (p. 280) state that as American Negroes are often refractory to *P. vivax*, *P. malariae* should be used for therapeutic purposes. A daily parasite count is desirable in therapeutic malaria ; they note that with *P. falciparum*, counts of 100,000 to 200,000 per cmm. are on the danger line. This last infection was rarely used.

FISCHER and YORK (p. 25) report transfusion malaria from blood donors who gave histories of quartan malaria 36–42 years before. *Charles Wilcocks*

[*To be continued*]

MALARIA

J. NATIONAL MALARIA SOC. 1947, Sept., v. 6, No. 3, 206-16. [19 refs.]
Medical Research in Malariology in the First Postwar Year, 1945-46. Report of the Committee on Medical Research [HAAS, V. H., Chairman].

More than 100 institutions or individuals in the United States and abroad were asked for information regarding medical research in malariology that was being actively prosecuted in 1945–46. The information received is summarized in this report. Thirty-one laboratories in the United States reported on their investigations ; these cover all aspects of the subject. The development and testing of new anti-malarial drugs is receiving most attention. Avian strains of malaria are very widely employed. In the United States, 15 laboratories were using avian parasites, 8 were using human and 7 simian parasites. *Plasmodium gallinaceum* was most frequently used. About half the laboratories in the United States were maintaining insectaries.

The response to requests for information lead the Committee on Medical Research to conclude that exchange of information regarding programmes and progress of research would be welcomed by all malariologists.

No significant diminution of the intensified medical research in malariology that characterized the war years had become apparent. It is pointed out, however, that the great majority of U.S. laboratories engaged in this work are dependent to a considerable extent on Federal government financial support.

Norman White

CANAPERIA, G. A. **Malaria in Italy during the War and Post-War Period.** *Bull. Office Internat. d'Hyg. Publique.* 1946, Oct.–Nov.–Dec., v. 38, Nos. 10–11–12, 1070–76. [French version 1062–9.]

As a result of antimalaria measures, the progressive reduction of malaria morbidity and mortality in Italy culminated in 1940 when the figures were the lowest ever recorded : 55,453 cases and 488 deaths as compared with 249,529 cases and 11,477 deaths in 1918. The recent war had a disastrous effect on the malaria situation. The destruction of bridges preventing the free flow of water and resulting in marsh formation ; the destruction of dykes and drainage works producing vast inundations ; increasing difficulty in maintaining antilarval work ; the dispersal of trained staff engaged on antimalaria work ; the progressive scarcity of antimalaria drugs ; overpopulation of endemic areas in which living conditions were precarious ; the presence of non-immune troops in endemic areas who became infected ; and the systematic removal of cattle by the enemy, were all factors responsible for greatly increased malaria incidence. This increase occurred wherever the two chief vectors of Italian malaria were present—*A. maculipennis labranchiae* in central and southern Italy, Sicily and Sardinia, and *A. sacharovi* along the coast-line of Venetia and Emilia. In areas where the much less important vectors *A. maculipennis maculipennis*, *A. m. atroparvus* or *A. m. messeae* predominated there was no marked exacerbation of the disease. In 1942 the registered number of cases and deaths had risen to 164,082 and 1,075 ; in 1944 to 373,941 and 422 ; and in 1945 to 411,602 and 386.

Since the cessation of hostilities, energetic antimalaria measures have been restarted with the cooperation of UNRRA and the Rockefeller Foundation. Conditions have improved. In certain areas DDT has been used with great success. A vast plan of control with DDT in all endemic areas was decided upon, in collaboration with UNRRA. The Rockefeller Foundation is directing a scheme for the eradication of anophelines from Sardinia by the use of DDT.

Norman White

FERRARO, F. Variazioni anofeliche nel bacino del Basso Volturno. [**Changing Anopheline Prevalence in the Volturno Delta.**] *Riv. di Malariologia.* 1947, Apr., v. 27, No. 2, 74–9. [12 refs.] English summary (7 lines).

War destruction in the Volturno Delta undid the work of years of effort. Bridges, roads and canals were wrecked with the result that the country reverted to conditions that characterized it before bonification. The author reports on the results of an anopheline survey, and on the saline content of water in breeding places. *A. maculipennis labranchiae* remains the most prevalent and important vector in the district, but *A. sacharovi* has appeared in places in which it had not previously been reported. *Norman White*

BULL. INST. HYG. MAROC. 1945, v. 5, 85–95, 1 chart. Rapport annuel du Service Antipaludique en 1945. [**Annual Report of Antimalaria Service, Morocco, in 1945.**]

Morocco suffered less than usual from malaria in 1945. During the summer months, malaria was less in evidence than were relapsing fever and numerous intestinal infections aggravated by scarcity. In the few localities, however, where conditions favoured anopheline propagation, severe outbreaks of malaria were made more deadly by destitution.

The year was abnormally dry after January. The annual number of cases of malaria treated by dispensaries etc. from 1940 to 1943 approximated 300,000. In 1945 it was 160,000. This figure is an overstatement, because at the

beginning of the outbreak of relapsing fever many cases of that disease were labelled malaria.

Routine antilarval activity was maintained. In 1,004 positive slides examined in the central laboratory there were *P. falciparum* 521, *P. malariae* 319, *P. vivax* 164. *Norman White*

SCHWETZ, J. with the collaboration of H. BAUMANN, Mme. BEUMER & M. FORT. Recherches sur le paludisme dans la bordure orientale du Congo Belge. [**Investigation of Malaria along the Eastern Frontier of the Belgian Congo.**] *Institut Royal Colonial Belge. Section des Sciences Naturelles et Médicales. Mémoires.* (Collection in-8°.) 1944, v. 14, No. 3, 216 pp., 9 maps (1 folding) & 42 figs. on 8 pls. [18 refs.]

This volume sets out in much detail the results of a tour of investigation into malaria conditions along the eastern frontier of the Belgian Congo, undertaken on behalf of the Belgian Royal Colonial Institute. The tour embraced the shores of Lake Kivu and the high plateaux surrounding the lake ; Rutshuru and its neighbourhood, between Lake Kivu and Lake Edward ; the Semliki Valley, between Lake Edward and Lake Albert, and the high plateaux overlooking it from the west ; Kasenyi and neighbourhood, on the south-eastern shore of Lake Albert ; Irumu ; and the gold mines at Kilo. The main objects of the tour were the verification of the belief that the high plateaux are free from endemic malaria ; the determination of the altitude at which such freedom becomes operative, and the study of malaria in mines and plantations among labourers who had been recruited from high altitudes. Recent reports had ascribed outbreaks of sickness, with considerable mortality, to malaria, on grounds which the author considered to be altogether insufficient.

In nearly all the numerous localities visited, a study was made of anophelines, adults and larvae, Blood preparations, both thick drop and smear, were made from 6,841 individuals. The formidable task of examining these films was carried out in Brussels after the return of the mission.

No evidence of indigenous endemic malaria was found in Rugari (1,700 metres above sea-level), Butembo (1,750), Kadjedje (2,150), Kabare (1,950), Numbi (2,200) and Ngweshe (1,760). Endemic malaria was, however, found in Nyangezi (1,650 metres) which is very close to Ngweshe, south-east of Lake Kivu. The line of demarcation is between 1,700 and 1,800 metres : above this, there is no endemic malaria. At the higher altitudes such redoubtable African malaria vectors as *A. gambiae, A. funestus* and *A. marshalli* were never found, though other anophelines, notably *A. christyi*, and very occasionally *A. kingi* and *A. transvaalensis*, were sometimes plentiful. *A. christyi* is evidently of no importance as a malaria vector.

Special attention was given to two mining areas, Kadubu-Mufwa and Mongbwalu and an agricultural district Rutshuru, where severe outbreaks of malaria had been reported. In none of these areas was there evidence of acute malaria, other than a few mild cases, but in one camp, Bwato Moke, blood examinations revealed a state of " subacute malaria ". There were no febrile reactions but there was a very heavy infection of adults with *P. malariae*, and a notable proportion of *P. vivax*, parasites which in Africans, in endemic areas, are restricted to the early years of life, before the acquisition of premunition. Such findings indicate malaria of recent origin.

The author briefly indicates some of the many unsolved problems of malaria in Africa that await elucidation, and recalls the recommendation made by him in 1938 to the Malaria Commission of the League of Nations for a coordinated programme of research to be carried out in the different African colonial territories. [See also this *Bulletin*, 1947, v. 44, 786.] *Norman White*

Schwetz, J., Baumann, H. & Fort, M. Nouvelles recherches sur les anophèles et le paludisme endémique dans l'agglomération de Coquilhatville (Congo belge). [**New Investigation of *Anopheles* and Malaria in Coquilhatville, Belgian Congo.**] *Ann. Soc. Belge de Méd. Trop.* 1947, Mar. 31, v. 27, No. 1, 139–59, 1 map.

The unusually low endemicity of malaria in the neighbourhood of Coquilhatville, where *A. gambiae* was not found and where *A. marshalli* var. *moucheti* was the most common anopheline, has previously been described by the authors [this *Bulletin*, 1939, v. 36, 777 ; 1943, v. 40, 103]. They now present the results of another brief survey carried out in November, 1945.

A. gambiae was still absent from Coquilhatville though it appeared, in small numbers, in neighbouring villages ; *A. marshalli* var. *moucheti* was still the predominant anopheline. The authors subscribe to the opinions expressed by Wolfs that the stratum of limonite (bog-ore) that lies on or near the surface acts as a deterrent to the breeding of *A. gambiae* [this *Bulletin*, 1947, v. 44, 164].

Blood examinations once more showed a very low prevalence of malaria ; parasites were very few in positive smears. *P. vivax* was not found and *P. malariae* was rare. Gametocyte carriers were very infrequent. *A. marshalli* var. *moucheti* is evidently a much less effective vector of malaria than *A. gambiae*. *Norman White*

Rebelo, A. O sezonismo em Quelimane. [**Malaria in Kilimane.**] *An. Inst. Med. Trop.* Lisbon. 1946, Dec., v. 3, 143–58, 1 fig. English summary.

Kilimane is a small town in Portuguese East Africa, in the coastal plain that lies to the north of the mouth of the Zambesi River. Next to scabies and yaws, malaria is the most prevalent disease. Among a population of 2,077, the annual number of malaria cases registered, between 1941 and 1944, varied from 881 to 2,129. The spleen rates of children in different parts of the town ranged between 58 and 77 per cent., and the parasite rates between 47 and 66 per cent. The percentages of plasmodia found in films were *P. falciparum* 97·9, *P. malariae* 2·7 and *P. vivax* 2·2.

Of 573 anophelines captured in dwellings, *A. funestus* formed 71 per cent. ; the remainder were *A. gambiae*. The sporozoite rates were *A. funestus* 3·1 (157 dissections), *A. gambiae* 5 per cent. (60 dissections). *Norman White*

Faust, E. C., Scott, J. A. & McDaniel, G. E. **Malaria Mortality and Morbidity in the United States for the Year 1945.** *J. National Malaria Soc.* 1947, Sept., v. 6, No. 3, 184–91, 2 figs.

Previous reports in this series showed the considerable increase in malaria mortality in the United States that synchronized with the economic depression of the mid-1930's and the subsequent substantial yearly decrease in mortality in practically every malarious State. During the recent war years, conditions were complicated by the establishment of large military centres in highly malarious areas and the return of innumerable military personnel and prisoners of war from hyperendemic malarious areas overseas. In spite of these conditions, the 1945 civilian malaria mortality figures are highly satisfactory. The total civilian deaths for 1945 numbered only 399, as compared with 584 in 1944 and 622 in 1943. In 1935, there were 4,268 certified deaths from malaria : meanwhile the population has increased perhaps 10 per cent. There are still hyperendemic malaria areas in the south-eastern States, in the Mississippi valley, in eastern Oklahoma and Texas and in the lower Rio Grande. Case-reporting of malaria is insufficient to provide accurate information of

the distribution and intensity of the disease, except in the States of South Carolina, Mississippi and Texas.

As in previous years, the basic data were obtained from the bureaux of vital statistics of each of the States. *Norman White*

PIÑERO GARCÍA, P. P. Endemiografia del paludismo en la provincia de Santa Fe. [**Distribution of Malaria in the Province of Santa Fe.**] *Kuba.* Habana. 1947, Apr., v. 3, No. 4, 95–8.

This paper contains a general description of the distribution of malaria in Argentina and a more detailed description of the topography and malaria incidence in the Province of Santa Fe. This province occupies the territory between the Parana River and the eastern frontier of Argentina. It contains 19 departments grouped into northern, central and southern zones. During nine years 2,497 cases were registered in the Province, 2,002 of these being in the northern zone. One of the northern departments, General Obligado, was alone responsible for 1,622 cases, 916 of them in a single year, 1941. *P. vivax* is the prevailing type of infection. It is probable that most, if not all, of the cases reported from the central and southern zones were relapses of infections acquired in the northern zone or elsewhere. *Norman White*

DEANE, L. M. Observações sôbre a malária na Amazônia brasileira. [**Observations on Malaria in the Amazon Region, Brazil.**] *Rev. Serviço Especial de Saúde Pública.* Rio de Janeiro. 1947, v. 1, No. 1, 3–60, 3 maps & 3 graphs. [30 refs.] English summary.

This report gives a summary of observations made by the Special Public Health Service between July 1942 and June 1946 on the distribution and transmission of malaria in the Amazon Region of Brazil. This huge territory of some 3,600,000 square kilometres comprises 41·5 per cent. of the total area of Brazil but has an estimated population of only one and a half million. The observations included the examination of 185,214 blood films and 43,496 spleens in 76 localities, the results of which are tabulated. The over-all parasite rate was 3·1 per cent.; the spleen rate 12·6 per cent. There were striking differences in the degree of malaria endemicity in different parts of the territory. The incidence of species of *Plasmodium* in the positive blood slides was *P. vivax* 63·2, *P. falciparum* 36·6, and *P. malariae* 0·2 per cent.

The examination of 562,054 adult anophelines and 1,390,734 larvae from 115 localities revealed the presence of 30 species and varieties, which are listed. The only important vectors of malaria are believed to be *A. darlingi* and *A. aquasalis*. The former was found throughout the region. *A. aquasalis* was confined to coastal districts. *A. albitarsis* var. *domesticus* was very abundant in some areas but did not appear to be as important a vector in the Amazon as it is reputed to be in other parts of Brazil.

House-spraying with DDT-kerosene solution promises to be a valuable control measure for *A. darlingi*. [See also this *Bulletin*, 1946, v. 43, 287.] *Norman White*

PINOTTI, M. A malária no Brasil. [**Malaria in Brazil.**] *Folha Med.* 1947, June 25 & July 5, v. 28, Nos. 12 & 13, 156 pp., 13 figs. & 2 maps.

A description is given of the constitution, organization and functions of the National Malaria Service of the National Health Department of the Ministry of Education and Health of Brazil, which was inaugurated in 1941. It consists of an Epidemiological Section, a Section of Organization and Control, a

Section of minor hydraulic engineering work, an Administration Section, and an Institute of Malariology.

A list is given of all localities in all the *municipios* of Brazil from which endemic malaria has been reported ; this list occupies 132 pages.

Fifty-four species of anophelines have been identified in Brazil. The distribution of these according to States is presented in graphic tabular form. Apart from *A. gambiae* which, imported from West Africa, played an important localized rôle in the transmission of malaria until it was eliminated, eight species have been found naturally infected with malaria, *A. darlingi*, *A. albitarsis*, *A. tarsimaculatus*, *A. strodei*, *A. noroestensis*, *A.* (*Kerteszia*) *cruzi*, *A.* (*K.*) *bellator* and *A.* (*K.*) *homunculus* (?).

A. strodei, though widely distributed, is probably of little or no practical importance as a vector. This also applies to *A. noroestensis*. The three species of *Kerteszia* are limited to the States of São Paulo, Parana, Santa Catarina and Rio Grande do Sul, where bromeliads provide facilities for their breeding. *A. darlingi* is the most redoubtable vector of all.

The report gives some illustrations of excellent drainage work ; of several species of bromeliads, and of the work being done to control *Kerteszia*.

Norman White

White, R. Senior, Ramakrishna, V. & Rao, V. V. **Malaria on the North Madras Coast.** *Indian J. Malariology*. 1947, Mar., v. 1, No. 1, 81–109, 1 graph. [11 refs.]

The area dealt with in this report is a narrow coastal plain between the Eastern Ghats and the Bay of Bengal, from the Rishikuliya River southward to the Vamsadahra River. It is mostly not more than ten miles in width. Only two rivers traverse the plain : both rise from the eastern face of the Ghats and are seasonal in their flow. Until ten years ago, this area of India was reputed to be completely free from malaria. In 1938, *A. sundaicus* was discovered in the coastal village of Naupada, associated with malaria prevalence. Each year thereafter until 1945, extensions of *A. sundaicus* foci were reported. These findings are summarized and tabulated.

In some places in the area, *A. stephensi* is the malaria vector ; in others both *A. stephensi* and *A. sundaicus* are responsible.

Reports on the salinity of *A. sundaicus* breeding places are summarized. It would seem that salinity as low as 100 parts per 100,000 is the optimum for oviposition, but no less than 50 per cent. of the total larval production occurs in waters with a salinity between 700 and 1,000 parts per 100,000. These findings suggest the existence of two races of *A. sundaicus*. The freshwater race is possibly a more efficient vector than the other. Further evidence is adduced favouring the hypothesis that two races exist. *Norman White*

Rao, T. R. **Visual Responses of Mosquitoes artificially rendered Flightless.** *J. Exper. Biol.* 1947, Sept., v. 24, Nos. 1/2, 64-78, 6 figs.

Normal mosquitoes are known to avoid the light in the daytime, but most of them tend to fly out of their dark shelters at dusk.

This paper describes experiments with mosquitoes (*Culex molestus* and *Anopheles maculipennis atroparvus*) prevented from flying by amputation of the wings or by fixing the wings together. It was thought that this method would allow more accurate measurement of their responses.

It was found that the mosquitoes, placed in a small arena illuminated from below, would always walk towards a dark section of the wall. This reaction

occurred wherever the black band was placed in their field of vision, provided that it was sufficiently wide to subtend an angle of 8° on the mosquito's eye.

Contrary to expectations, there was no change in the insect's avoidance of light at dusk. About 10 per cent. of the mosquitoes were slightly abnormal in their directional response towards the black band, but only one out of all the specimens investigated actually moved *towards* the light.

J. R. Busvine

VOGT, G. B. **Salinity Tolerance of *Anopheles quadrimaculatus* and Habitat Preference of *A. crucians bradleyi*.** *J. Econom. Entom.* 1947, June, v. 40, No. 3, 320–25.

The purpose of this paper is to establish for one locality, a carefully defined example of appreciable salinity tolerance of *Anopheles quadrimaculatus*, which is generally regarded as a distinctly freshwater anopheline. Notes on *A. crucians bradleyi* and *Culex salinarius* are also included.

The investigation was made in the vicinity of Scotland, St. Mary's County, Maryland, U.S.A. Sampling stations in Deep Creek were selected because they gave a range of salinities from minimum to maximum values. The sampling methods and characteristics of the creek are described.

Larvae were found in the north arm of the creek where salinity ranged from 1,400 to 2,800 ppm. soluble chlorides, but they did not occur in the south arm where the salinity was from 4,400 to 6,300 ppm., although the *p*H and the plant coverage were similar in both places. On one occasion in the south arm, larvae were found after an original salinity of 2,900 ppm. soluble chlorides had increased to 5,200 ppm. but these were survivors whose development had begun at the lower salinities. From the results of the observations which are summarized in four tables, it is concluded that the salinity tolerance of *A. quadrimaculatus* may be as high as 2,900 ppm. soluble chlorides.

The only other mosquitoes associated with *A. quadrimaculatus* were *A. crucians bradleyi* and *Culex salinarius*. The distribution of the larvae of these two species seemed to be unrelated to salinity. They were found in the marshy ground between the two arms of the creek; only in the spring and autumn were they collected from the exposed water surface associated with the Sago pond-weed.

H. S. Leeson

RACHOU, R. G. & FERREIRA, M. O. As *Kerteszias* como os grandes responsáveis pela malária no litoral do Estado de Santa Catarina. [**The *Kerteszia* Mosquitoes as Prominent Vectors of Malaria in Littoral of the State of Santa Catarina, Brazil.**] *Folha Med.* 1947, Jan. 5, v. 28, No. 1, 8 pp.

MAEGRAITH, B., ANDREWS, W. H. H. & GALL, D. **A Hepatic Syndrome of Wide Distribution illustrated by Lesions in Malaria and Blackwater Fever.** *Lancet.* 1947, Nov. 29, 781–4. [73 refs.]

In fatal cases of malaria, necrosis of the liver cells occurs in the inner two-thirds of the lobule, being most prominent in the cells surrounding the central veins and sinusoids, which may be deeply congested. This hepatic lesion resembles that resulting from right-sided heart failure associated with tissue anoxia arising from interference with escape of venous blood from the liver. As right-sided heart failure is not a feature of malaria, some other factor must be involved in the obstruction to the outflow from the liver of venous blood. Histological evidence gives no support to obstruction by agglutination of red

cells, thrombosis or degenerated Kupffer and littoral cells. The authors suggest that in malaria, blackwater fever and various other conditions in which the same lesions arise from stagnant anoxia, the obstruction to the venous flow from the liver is brought about by reflex constriction of some part of the hepatic venous tree. It is difficult to understand why the anoxia should affect the cells at the centre of the lobule only, but it is supposed that some process exists which permits the peripheral cells to remove the oxygen from the blood. The constriction is brought about by nervous reflexes which may have their origin within or outside the liver. If arising outside the liver, they probably account for the relationship between hepatic and renal disturbances.

C. M. Wenyon

Dubois, A. Observations sur la pathologie paludéenne chez les indigènes de Pawa (Nepoko). [**Observations on the Pathology of Malaria among the Natives of Pawa (Nepoko).**] *Ann. Soc. Belge de Méd. Trop.* 1947, Mar. 31, v. 27, No. 1, 17–24.

The author has noted a much higher incidence of splenomegaly among adult females than among adult males in Pawa, Belgian Congo. There is no other evidence that females suffer more from malaria than males. The phenomenon appears to be due to the greater relaxation of visceral ligaments and of the abdominal wall that characterizes the female. In routine examinations, the spleen is palpated with the patient standing. The splenic index may thus be misleading unless it be confined to children.

The curve of age incidence of malaria in Pawa differs somewhat from that found in most other parts of the Belgian Congo at similar altitudes; Pawa is 800 metres above sea-level. Maximum spleen and parasite rates are attained at slightly older ages; this is attributed to the relatively low anopheline density in Pawa.

Norman White

Whorton, C. M., Pullman, T. N., Kirschbaum, W. R., Jones, R. Jr., Alving, A. S., Craige, B., Jr., Eichelberger, Lillian & Coulston, F. **The Chesson Strain of *Plasmodium vivax* Malaria. IV. Immunity.** *J. Infect. Dis.* 1947, July–Aug., v. 81, No. 1, 1–6, 2 figs. [25 refs.]

In previous communications, the authors have described certain characteristics of induced malaria with the Chesson strain of *P. vivax*, of New Guinea origin [this *Bulletin*, 1948, v. 45, 139–40]. In this paper, immunity acquired from such infection is described. In 135 primary attacks of sporozoite-induced infections, the onset of fever occurred when the average parasite count was 10 parasites per cmm. With the first and second relapses, there was a progressive increase in the parasite density at the onset of fever, but with the third relapse the pyrogenic threshold did not differ significantly from that of the second. Similarly, in trophozoite-induced infections, the threshold at the onset of clinical reactivation was higher than at the onset of the first period of clinical activity.

In trophozoite-induced infections, peak parasitaemia was noted on the 12th day on the average with a range of 5 to 46 days. Parasite densities were higher than those reported with indigenous strains, the mean maxima in 95 patients being 33,000 parasites per cmm. of blood (2,600 to 90,000).

Negroes were refractory to infection with trophozoites.

In white subjects, acquired immunity, to both homologous and heterologous strains, was demonstrated.

Norman White

HIRSCH, W. **The Spleen as a Decisive Factor in Medical Diagnosis.** *Acta Med. Orientalia.* 1947, Oct., v. 6, No. 10, 307–21. [Bibliography.]

HERNBERG, C. A. **Clinical Observations on Malaria Tertiana in Finland, and on the Difference between Autumn and Spring Malaria.** *Acta Med. Scandinavica.* 1947, Aug. 30, v. 128, No. 5, 428–51, 4 figs. [Numerous refs.]

The author has previously described the epidemiology of the considerable outbreaks of malaria in Finland during and after the Finnish-Russian war, 1941–1944 [this *Bulletin*, 1947, v. 44, 15]. In this contribution, he summarizes the results of a study of the clinical records of 1,574 cases. *P. vivax* malaria is more benign in Finland than in more southern countries. In this series there was less tendency to relapse ; spleen enlargement was uncommon, and there was no mortality.

Spring cases, following prolonged incubation periods, are compared with autumn cases. July 15 was selected as the limiting date between spring and autumn cases. Initially, spring attacks tend to be milder ; splenic enlargement is less common ; haemoglobin and red cell counts are higher, and the sedimentation rate is somewhat lower. But as the disease progresses, the spring attack is apt to become more severe than the autumn attack ; relapses become more common and the intervals between relapses shorter. Attacks after prolonged incubation or latent periods are more frequently characterized by irregular fever.

Malaria relapses are very rare in the dark months of the year, a fact that the author ascribes to a lessened virulence of the *Plasmodium* at this season of the year. *Norman White*

YOUNG, M. D., ELLIS, J. M. & STUBBS, T. H. **Some Characteristics of Foreign Vivax Malaria induced in Neurosyphilitic Patients.** *Amer. J. Trop. Med.* 1947, Sept., v. 27, No. 5, 585–96, 2 figs. [11 refs.]

This is a comparative study of the characteristics of various strains of *P. vivax* used in the treatment of Service neurosyphilitic patients. Altogether, 27 strains were used, but most patients were treated with one of four Pacific and one Mediterranean strain. Some infections were transmitted by blood inoculation, but most were transmitted by *A. quadrimaculatus*.

The average prepatent period in 117 mosquito infections was 12·8 days ; the average incubation period 14·2 days. These periods were significantly shorter for Mediterranean than for Pacific strains. The maximum fever usually preceded the maximum parasitaemia by several days : the average of first maximum fever was 106°F. ; the average maximum parasitaemia was 13,900 per cmm. (65 patients). In blood-induced infections, maximum fever and maximum parasitaemia tended to synchronize. The average parasitaemia was higher with Pacific than with Mediterranean strains, but the fever response showed no significant difference.

Chills characterized 73·2 per cent. of the paroxysms, but they were less in evidence with the first five than with later paroxysms. Fever at onset was quotidian in 50 per cent. of cases, remittent in 42 and tertian in 8 per cent. Sodium bismuth thioglycollate was effective in changing remittent and quotidian to a tertian type of fever. The periodicity of tertian fevers averaged 44·5 hours, 43·6 to 45·1 : it was never 48 hours. Primary infections produced more than 10 paroxysms in most cases. The foreign malaria strains studied are satisfactory for the treatment of white neurosyphilitic patients, but Negroes proved refractory.

There was no evidence of the development of heterologous immunity between 5 foreign strains and the native St. Elizabeth strain. *Norman White*

MEIRA, C. Abdome agudo e malária. [**An Acute Abdomen in Malaria.**] *Hospital.* Rio de Janeiro. 1947, Oct., v. 32, No. 4, 633–9.

A case in which malaria complicated an appendix abscess, with alteration of the blood picture.

NEWPORT, N. M. **Sodium Chloride and Fluid Replacement in Treatment of Malaria.** *Southern Med. J.* 1947, Oct., v. 40, No. 10, 825–9, 1 fig. [10 refs.]

The shock-like syndrome occasionally seen in severe malaria is considered to be due partially to deficiency of sodium chloride resulting from dehydration and toxaemia. The shock in algid malaria may be initiated by release of malaria parasite proteins, which leads to an anaphylactic type of reaction, becoming progressive because of sodium deficiency. Of 18 patients suffering from malaria of varying severity, the whole-blood chloride values were low normal or subnormal in 16. The urinary chloride excretion was determined in only two of these patients ; it was subnormal in both. The early administration of intravenous normal saline combined with 5 per cent. glucose has been of great service in algid malaria ; a typical case is described. Glucose alone was ineffective. The use of diaphoretic drugs, especially phenacetin, which provoke and prolong excessive diaphoresis, is condemned. *Norman White*

MAMOU, H. Intolérance grave à la quinine. Guérison par transfusions massives. [**Severe Intolerance to Quinine, cured by Massive Transfusions.**] *Rev. Paludisme et Méd. Trop.* 1947, Nov. 15, v. 5, No. 42, 273–7.

A doctor who lived in a malarious area in Tunisia for several years, was taken ill with fever and general malaise. He gave himself an injection of quinine (1 gm.). A few hours later, he experienced pain in the knees and at the same time a light petechial purpura appeared on the lower limbs and back ; the next day another intramuscular injection of 1 gm. of quinine produced a fall in temperature, but was followed by a spreading of the purpura, with haemorrhages from the mucous membranes, *e.g.* epistaxis, gingival bleeding, haematuria and melaena. There was extreme clinical anaemia, with red cells falling to 2 million per cmm. and below : other clinical signs were few, and the urgent condition was evidently the anaemia from the haemorrhagic state.

For eight days, therefore, transfusions of 300 cc. of blood were given every 2 or 3 days, but the haemorrhages continued : on the evening of the ninth day, after a transfusion of 300 cc., a further 500 cc. were given. The same evening a dramatic improvement took place ; a further transfusion was given next day and the patient began convalescence : this was protracted, associated with psychological anxieties, but eventually the patient became completely well.

The author discusses the diagnosis and gives reasons for eliminating malarial purpura, bilious haemoglobinuria, quinine haemoglobinuria, haemophilia and quinine poisoning. It was almost certainly an intolerance to quinine, and this is supported by the fact that, eleven years later, when the patient suffered from malaria which was readily cured by mepacrine, he took 0·30 gm. of quinine hydrochloride by the mouth : the same day, a generalized purpura ensued. It is added that the patient was also intolerant to aspirin. The possible causes of this idiosyncrasy are discussed. *H. J. O'D. Burke-Gaffney*

MACDONALD, D. R. **Two Cases of Fugue after Mepacrine Administration.** [Memoranda.] *Brit. Med. J.* 1947, Dec. 13, 959.

The author describes fugues occurring after moderately heavy doses of mepacrine in two Europeans in the Sudan in 1945, one being a woman of 32, the second a man of 47.

The first patient was happily married, free from worries, and from any history of mental disorder. She received a total of 1·8 gm. of mepacrine over four days for the treatment of a proved *P. falciparum* infection and responded so rapidly that she felt well on the fourth day. She retired to bed at 9.30, and chatted, apparently cheerfully and normally, with her husband : the next morning, the husband awoke to find that his wife had disappeared : her body was found soon after in the river and death was shown to be due to drowning, without evidence of other abnormalities.

The second patient had suffered from claustrophobia after shell-shock during the 1914–18 war, but had recovered by 1924. He had also suffered recently from subtertian malaria and had 1·6 gm. of mepacrine in 5 days, followed by 10 grains of quinine bihydrochloride t.d.s. from the sixth to the tenth day. On the sixth evening, the patient felt sick after taking quinine, and on the seventh, without medical advice, he reverted to mepacrine (0·1 gm. t.d.s.). On the evening of the ninth day (after he had taken a total of 2·4 gm. of mepacrine) the patient went to his bath at 6 p.m., where he felt a " feeling of unreality coming over him." He then found himself sitting, naked and wet, in his dining-room and this amnesia lasted for about half an hour. Immediate stoppage of mepacrine resulted in no further ill-effects [see also FINDLAY, this *Bulletin*, 1947, v. 44, 763]. *H. J. O'D. Burke-Gaffney*

HOOBLER, S. W. **Psychotic Reactions to the Ingestion of Large Doses of Quinacrine in Normal Subjects.** *Amer. J. Trop. Med.* 1947, July, v. 27, No. 4, 477–81.

Thirty-one medical, dental and medical administrative corps officers volunteered to take quinacrine (mepacrine) at first in suppressive and then in therapeutic dosage. None had ever had malaria, nor were they in an endemic area. The dosage was : 0·1 gm. daily for 1–2 weeks ; 0·1 gm. twice daily for one week ; and finally 0·4 gm. three times one day, 0·3 gm. three times the next day, and 0·1 gm. three times daily for the next four days. Twenty-four of these officers developed toxic central nervous system symptoms varying from mild insomnia and depression to severe psychotic reactions in three cases. The symptoms subsided promptly on discontinuing the drug. The most toxic reactions occurred in two persons with a previous history of depressional episodes. The worst and most prolonged effect occurred in the case of an officer who exceeded the above dosage. He took 0·5 gm. instead of 0·3 gm. on the third [? second day] of intensive dosage. The earliest manifestations of cerebral toxicity are insomnia, restlessness, increased dreaming, and mild depression or elation. [See above.]

[This work may be compared with the extensive observations made on volunteers by the British Army Malaria Research Unit ; see MAEGRAITH & HAVARD, this *Bulletin*, 1945, v. 42, 863.] *Norman White*

See also p. 268, WILLIAMS, **The Tropical Lichen Planus Syndrome.**

CLAVERO, G., ROMEO VIAMONTE, J. M. & LOZANO, A. Tratamiento del paludismo con paludrina. (Primeros ensayos en España.) [**Treatment of Malaria with Paludrine : First Trials in Spain.**] *Kuba.* Habana. 1947, Aug., v. 3, No. 8, 183–5.

Twelve cases of acute malaria, ten *P. vivax* and two *P. falciparum* infections, were treated with paludrine. The dose given to adults was 0·10 gm. thrice daily for five or six days. The symptoms were relieved and asexual parasites disappeared from the peripheral blood in less than 60 hours in all cases.

Norman White

AFRIDI, M. K., RAMAKRISHNAN, S. P., GOSWAMI, A. & MENON, M. K. **An Enquiry on certain Aspects of Paludrine.** *Indian J. Malariology.* 1947, Mar., v. 1, No. 1, 221–9.

This describes an inquiry to determine the optimum single dose of paludrine for the control of the clinical symptoms of malaria. For this purpose two villages, Kechi Beg and Ahmad Kanzai, four and six miles south of Quetta, Baluchistan, were selected. Here malaria is highly endemic, but the transmission season is of only about 12 weeks' duration. The spleen rates in these villages were 23·6 (June) and 69·6 (September), and the parasite rates 1·97 and 4·3 per cent. respectively. The inquiry lasted from July 6 to October 2: transmission is low in July and August but at its height in September. Villages were preferred to a hospital, for this inquiry, because the follow-up of patients presented fewer difficulties. A single-room hut in the centre of each village served as a dispensary; patients were received daily six days a week.

Patients suffering from fever, with malaria parasites in their blood, were treated with either: (1) One tablet of paludrine, 100 mgm.; (2) a single dose of 3 tablets, 300 mgm.; (3) two tablets of paludrine twice a day as long as the patient attended (up to 3 days); or (4) three tablets of mepacrine a day in two doses as long as the patient attended (up to 3 days).

Altogether, 563 patients were treated; records regarding the day of disappearance of fever and parasites are available for 241 cases.

The single dose treatments with either 100 or 300 mgm. paludrine caused abatement of fever and disappearance of parasites within 3 days, in a high proportion of cases. Multiple doses in treatment (3) gave no significantly better results than treatment (2). Mepacrine gave no better results than treatments (2) and (3), although a slightly smaller proportion of patients treated with mepacrine returned with second attacks.

The conclusion was that the optimum single dose of paludrine to obtain a clinical cure of a malarial attack was 300 mgm. *Norman White*

ROSS INSTITUTE OF TROPICAL HYGIENE (INDIA BRANCH). **Report to the Committee of Control of the Ross Institute (India Branch) on the Control of Malaria in Industrial Labour Forces in India** [MACDONALD, G., M.D, D.P.H., D.T.M., Director of the Ross Institute of Tropical Hygiene, Keppel Street, Gower Street, London, W.C.1.] pp. iii+72, 8 figs. 1947.

One of the objects of an extensive tour made by the author in the north-east and south of India was to enquire and report on the extent to which recent developments in malaria control can be economically adapted to the needs of industry in India. It was clear that recent developments could not be considered without regard to existing practices, with which they must be integrated. The result is this very useful pamphlet which deals with the whole subject of malaria control in this part of the world, with special reference to new weapons which wartime research has made available, new antimalarial drugs, DDT, Gammexane, etc. The pamphlet is not intended for the expert malariologist. It is concise and clear and should be of great value to medical officer and layman alike, who are concerned with these problems and who have an elementary knowledge of malaria.

In the parts of India with which the author is concerned, the most important malaria vectors are *A. minimus*, *A. philippinensis*, *A. culicifacies* and *A. fluviatilis*, but many of the author's recommendations are of general application, whatever the vector may be.

It appears that DDT in India has been discredited, chiefly on account of the grossly inadequate quantities that had been applied. This arose from the

fact that preparations containing DDT, and not DDT itself, had been purchased and then diluted excessively. The warning is timely.

Jaswant Singh's modification of Field's quick staining method, for thick and thin blood films, is described and strongly recommended: the preparation of the stain is clearly described. *Norman White*

WOODRUFF, A. W. **The Suppressive and Schizonticidal Value of Paludrine (100 mg.) in Vivax Malaria.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1947, Oct., v. 41, No. 2, 263–7, 1 chart.

Twenty patients suffering from *P. vivax* malaria were treated with paludrine. Most of the patients were ex-prisoners of war from the Far East. All had had previous attacks of malaria, varying in number from one to twenty; most had had relapses since repatriation. Each patient admitted to hospital for a malaria attack was treated with a single tablet of 100 mgm. of paludrine only. On discharge from hospital, each patient was given 25 of these tablets with instruction to take one each week. A year after admission to hospital, that is, six months after the completion of the paludrine course, a questionary was sent to each patient asking for information about long-term and short-term relapses.

During the acute attack, the response to a single dose of paludrine was slow, but the attack was controlled in all cases. The temperature fell to normal in 12 hours in only 7 of 15 cases; in 3 cases the febrile period lasted more than 48 hours after the administration of the drug. The dose of 100 mgm. is probably sub-optimal and should be increased.

During the period of 6 months in which the patients were receiving 100 mgm. paludrine weekly, one relapse was seen and three other possible clinical attacks were reported.

During the 6 months immediately after the 6 months of suppressive paludrine, there was one long-term relapse and one other possible clinical relapse.

No toxic manifestations were seen at any time. *Norman White*

KENNEY, M. & BRACKETT, S. **The Effectiveness of Metachloridine in suppressing Natural Infections with *Plasmodium malariae* and *P. falciparum* in British Guiana.** *Amer. J. Trop. Med.* 1947, July, v. 27, No. 4, 493–501. [11 refs.]

Metachloridine (2-metanilamido-5-chloropyrimidine) was tried as a suppressive of malaria in British Guiana. For this purpose, four schools in the neighbourhood of New Amsterdam were selected. The children in these schools are children of labourers on sugar estates. Negroes and East Indians are about equally represented. The schools are in a flat coastal area where suitable breeding places for *A. darlingi*, the chief vector, abound.

The treated group and the control group each consisted of 250 children. Treatment lasted from February 4 to April 17, and from May 6 to July 26, 1946; the interval was the Easter holiday. Up to May 30, each treated child received the appropriate proportion of the adult dose, one gramme per week, divided into 2, 3 or 5 parts: the weight of the child determined the dose. On May 30, the dosage was doubled. Blood smears were examined just before treatment was started, immediately after the Easter holiday, 50 days after the termination of treatment and at intervals of 3 weeks during treatment.

Before treatment, 9 of the control group and 8 of the treated group harboured *P. malariae*. During treatment, there were 58 positive *P. malariae* slides (35 children) in the control group; none in the treated group. Metachloridine is a highly effective suppressant of *P. malariae*.

During treatment, there were 93 positive *P. falciparum* slides (60 children) in the control group; 37 (24 children) in the treated group. The reduction in *P. falciparum* parasitaemia as compared with the control group was 40 per cent. during the period of one gramme dosage, and 72 per cent. with two grammes. No symptom of toxicity was ever seen.

There were 11 positive *P. vivax* slides in the control group; only one in the treated group, possibly owing to failure to take the drug. *Norman White*

TRAVIS, B. V. **Relative Effectiveness of various Repellents against** *Anopheles farauti* **Laveran.** *J. National Malaria Soc.* 1947, Sept., v. 6, No. 3, 180–83.

Tests were done at Guadalcanal with a small cage, and at Efate with a large insectary. Volunteers exposed their treated and untreated limbs simultaneously to this mosquito, and noted the times for the first bite on the treated areas.

An earlier paper (TRAVIS *et al.*, *J. Econom. Entom.*, 1946, v. 39, 627] showed that while one compound was the most effective repellent for a certain biting insect, another might be better against a different insect. The present paper provides more data to support this conception, because the standard repellents dimethyl phthalate and Indalone were found to be of only moderate value against *A. farauti*. The compound R. 612 (2-ethyl-1,3-hexanediol) and certain other substances (such as undecylenic acid) were much better.

It was concluded that a mixture of repellents was more satisfactory than any single one. The 6 : 2 : 2 mixture (dimethyl phthalate R.612 and Indalone) was fairly satisfactory against *A. farauti*. *J. R. Busvine*

TONKING, H. D., LAVOIPIERRE, R. & COURTOIS, C. M. **A Small Scale Experiment in the Use of DDT in Mauritius.** 5 pp. 1946. Port Louis: J. H. Bowkett, Govt. Printer. [10 cents.]

In a small-scale experiment during the period December, 1945 to March, 1946, the authors demonstrated to their own satisfaction that DDT applied as a residual insecticide (5 per cent. DDT in kerosene) to the type of labourer's dwelling found in Mauritius resulted in a pronounced reduction in the numbers of *A. funestus* and *A. gambiae* caught by hand in those dwellings. The procedure was welcomed by the populace concerned and it was decided to experiment further on a larger scale to determine the effect of this residual insecticide on the incidence of malaria. [See below.] *R. Ford Tredre*

TONKING, H. D. & GÉBERT, S. **The Use of DDT Residual Sprays in the Control of Malaria over an Area of 16 Square Miles in Mauritius.** *Medical and Health Department Mauritius. Central Laboratory Publication No. 40.* [1947.] 23 pp., 1 folding map. [10 refs.] [30 cents.]

A hyperendemic area of 16 sq. miles (2 miles of coast) on the west coast of Mauritius (20°S. 58°E.) having a population of 2,600, isolated from other large communities, was chosen for this experiment. Numerous rivers, streams, canals and springs exist, all of which are sluggish in flow with much spyrogyra; a freshwater marsh is present along a coastal sandbar.

The climate is equable with small diurnal temperature range and high relative humidity. Rainfall is scanty except from December to March, the summer season.

Conditions are extremely favourable for the breeding of *A. funestus*; there is some diminution in breeding in the winter months. Hand catches in houses reveal a proportion of *A. funestus* to *A. gambiae* of 36 to 1 in the winter and 98 to 1 in the summer. In houses, the adult *A. funestus* prefer to rest in the roof above the un-ceilinged walls.

A solution of 4·6 per cent. DDT in kerosene was applied by " Four Oaks " sprayers of standard pattern on three occasions at intervals of 12–14 weeks ; the concentrations of DDT per sq. foot for the three treatments were estimated as 178, 112 and 150 mgm. respectively. The internal surface of the walls and roof of all human and animal dwellings were so treated.

Figures are given, for one coastal village, of the numbers of *A. funestus* " knocked down " by " Pyagra " spray on different days in thirteen huts before and after the application of residual insecticide. Hut populations of *A. funestus* varying between 6 and 839 were reduced to nil, the latest investigations being eight weeks after the previous application of DDT.

At the same time of year (Dec. 1946) a similar investigation was carried out in an adjacent " untreated " settlement ; the hut populations are tabulated for fifteen separate days and average 202 *A. funestus* per hut.

The incidence of malaria is shown below :—

General Population

	Number thick films	Parasite index	Parasite index control village
		Per cent.	Per cent.
August, 1946	1,000	37·6	—
March, 1947	858	10·5	—
June, 1947	441	12·9	46·5

School Children of One Village

	Number thick films	Parasite index
		Per cent.
August, 1942	150	65·5
March, 1947	144	25·0
June, 1947	105	32·4

August sees the end of winter, March is the middle of the hot season and June the end. The first application of DDT commenced in September. Additional figures of carrier rates and species of parasite are recorded. [The protozoologist might question the diagnosis of species from thick blood films.]

The authors conclude that the result of the spraying has been to lower the parasite index of the general population in that area by two-thirds and of the children by one-half. Finally, they recommend that the residual insecticide method should be combined with the extensive use of Paludrine, and also the maintenance and continuation of anti-malarial works where these are economically possible.

[Sufficient information is available in this paper to indicate that DDT as a residual insecticide is effective in controlling the presence of *A. funestus* in dwellings and so reducing markedly the frequency of transmission of the malaria parasite. The possibility of outdoor biting is not referred to, nor is there

any reference to mosquitoes entering, feeding and leaving dwellings without contact with DDT. In other districts of the island, *A. gambiae* is of more importance as a vector than *A. funestus*.] *R. Ford Tredre*

GLASGOW, R. D. **The Significance of Particle Size in Sprays and in Aerosol Fogs.** *Mosquito News.* 1947, Mar., v. 7, No. 1, 22–7.

COLLINS, D. L **Technique employed in the Study and Measurement of Aerosol Fog Droplets.** *Mosquito News.* 1947, Mar., v. 7, No. 1, 29–35, 10 figs.

TONKIN, Isabel M. **The Influence of the Suspending Fluid on the Survival of Sporozoites *in vitro*.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1947, Oct., v. 41, No. 2, 259–62.

During the course of experiments with the use of sporozoite-induced infections of *Plasmodium gallinaceum* it was noticed that the last chicks in a batch failed to become infected, presumably because the sporozoites had died by the time they were inoculated. The sporozoites were obtained by grinding up heads and thoraces of infected mosquitoes in normal saline (1 mosquito in 0·2 ml. of fluid). The suspension was centrifuged lightly to throw down major débris.

Different diluting media were then tested in order to determine the fluid in which sporozoites survived longest. These included saline, Ringer's solution, heparinized chick plasma, and heparinized chick plasma with equal parts of saline. Even half an hour's exposure (at 24°C.) was shown to be damaging to sporozoites when they were suspended in saline or Ringer, but in plasma or plasma saline, they survived with no apparent change, for more than 14 hours. Citrated chick plasma proved less satisfactory than the heparinized equivalent, and if the temperature was raised from 24°C. to 37°C., the survival time was much shorter in all the media.

[The use of this simple modification in technique should result in much more standardized results in experiments with sporozoite-induced avian and mammalian malaria.] *P. C. C. Garnham*

TONKIN, Isabel M. & HAWKING, F. **The Technique of testing Chemotherapeutic Action on *Plasmodium gallinaceum*.** *Brit. J. Pharmacol.* 1947, Dec., v. 2, No. 4, 221–33, 3 figs.

The authors give details of antimalarial tests in chickens infected with *P. gallinaceum* by intravenous inoculation with approximately 10 million parasites or with a suspension of sporozoites obtained by grinding the heads and thoraces of infected mosquitoes in saline, followed by light centrifugation and the addition of chick plasma to the supernatant. The percentage of infected cells in the blood was determined on the fifth day after drug treatment; different dosage schedules were used. The criterion adopted in assessing results was the efficacy of a particular treatment in reducing parasitaemia to a low level. The chickens used were about 10 days old and weighed 60–80 gm. Quinine, atebrin (mepacrine), plasmoquine (pamaquin) and sulphadiazine were given orally within an hour of inoculation. The total amount of drug was administered in a single dose or in smaller doses spread over a period of four days. The therapeutic response to these drugs and their blood concentration, except in the case of plasmoquine, were estimated in connexion with the different dosage schedules. In the case of sulphadiazine, the best therapeutic results were obtained when the doses were spread over the period of four days, whereas in the case of the other drugs a concentrated treatment was more effective in

blood-induced infections. Sulphadiazine only was used in prophylactic experiments; administration spread over four days was again more effective than a more intense medication, as judged by the number of parasitized red cells present on the fifth day. It was doubtful whether sterilization occurred with this drug; its action on blood forms and pre-erythrocytic forms appeared to be about the same. The four-day treatment as generally employed appears, on the whole, to have distinct advantages. *J. D. Fulton*

RIMINGTON, C. & FULTON, J. D., with the assistance of H. SHEINMAN. **The Pigment of the Malarial Parasites** *Plasmodium knowlesi* **and** *Plasmodium gallinaceum.* *Biochem. J.* 1947, v. 41, No. 4, 619–22, 5 figs. on 1 pl. [16 refs.]

"1. The pigment of malarial parasites (*P. knowlesi* and *P. gallinaceum*) has been extracted by a technique which avoids the use of alkali at all stages.

"2. From this material, crystalline haemin and pyridine haemochromogen have been prepared.

"3. A comparison of the spectral absorption of malarial pigment and of haemin in different solvents and of the visible bands and Soret bands of haemoglobin derivatives made by combining these pigments with renatured ox globin confirms the identity of both malarial pigments with haematin (ferriprotoporphyrin)."

TRYPANOSOMIASIS

HEGH. E. **Les tsé-tsés. Description-biologie-moyens de destruction.**

This book is reviewed on p. 275.

VANDERPLANK, F. L. **Some Observations on the Hunger-Cycle of the Tsetse-Flies** *Glossina swynnertoni* **and** *G. pallidipes* **(Diptera) in the Field.** *Bull. Entom. Res.* 1947, Dec., v. 38, Pt. 3, 431–8, 1 fig.

The author wishes to know whether the interval between a tsetse's successive meals is longer at one season than another.

The method used is to estimate the "hunger stage" of the live fly. Those males which are captured in stage 1 (replete, recently fed) or stage 4 (very hungry) are marked with distinctive spots of paint; the tip of the proboscis is snipped off to prevent further feeding, and the insect is released. On subsequent days a considerable proportion of marked flies are recaptured and the hunger stage which they have reached is recorded.

The type of result obtained may be illustrated by the results with *G. swynnertoni* for December. Of flies released in stage 4 (very hungry), fifteen were recovered in the two subsequent days and none later. Flies released in stage 1 (replete) had reached stage 4 when recaptured between the 4th and 11th day (mean 7·35 days: 23 individuals). From data of this type the author concludes that, at that season, flies released when "very hungry", and unable to feed, carry reserves of food and water sufficient for two days or less. Those which were "replete" did not require to search for food for a number of days, and were therefore recaptured after about a week.

The paper contains similar data for *G. swynnertoni* for eight successive months, with monthly data on wind velocity, saturation deficiency and evaporation: also for *G. pallidipes* on a less extensive scale. It is conclusively shown that the mean hunger cycle of both species varies with season, is significantly correlated with measurements of humidity, and is shorter when humidity is low, or evaporation high. Under the conditions which prevailed, seasonal differences in temperatures were slight, and without appreciable effect on hunger

cycle. It is known that *G. pallidipes* feed less freely than *G. swynnertoni* under moist conditions, but more frequently in the dry season.

[The plural of proboscis is repeatedly given as " proboscidae ". Surely an editor should be prepared to adjust an error of this nature.] *P. A. Buxton*

NASH, T. A. M. **A Record of *Syntomosphyrum glossinae* from Nigeria.** *Bull. Entom. Res.* 1947, Dec., v. 38, Pt. 3, 525.

Some 23 years ago LLOYD *et al.* [this *Bulletin*, 1927, v. 24, 891] attempted unsuccessfully to introduce the Chalcidid pupal parasite *Syntomosphyrum glossinae* into a part of Northern Nigeria as a measure of control of tsetse flies. [A similar experiment had been tried with little success by LAMBORN in Nyasaland (*ibid.*, 1925, v. 22, 291).] It is suggested that the seasonal high temperature and low humidity were responsible for the failure of the experiment.

The present author now records that in April 1947, the laboratory stock of *Glossina palpalis* puparia from the Kaduna area (which is 210 miles south-west of Sherifuri, where LLOYD *et al.* had experimented, in breeding sites of *G. morsitans* and *G. tachinoides*), suddenly became heavily infested with *S. glossinae*. It is presumed that an infected pupa had been brought in from the bush and had initiated the mass infestation of the offspring.

The author concludes that *S. glossinae* is indigenous in Nigeria and that its presence cannot be attributed to the abortive efforts of LLOYD *et al.* twenty-three years ago.

[The reference to LLOYD and JOHNSON given by the author appears to be incorrectly quoted: it presumably refers to LLOYD, JOHNSON and RAWSON (*Bull. Entom. Res.*, 1927, v. 17, 423, referred to above] and not to " Lloyd and Johnson (*Bull. Entom. Res.* **27,** p. 449, 1927) " as stated by the author.]

H. J. O'D. Burke-Gaffney

GLASGOW, J. P. & DUFFY, B. J. **The Extermination of *Glossina palpalis fuscipes*, Newstead, by Hand Catching.** *Bull. Entom. Res.* 1947, Dec., v. 38, Pt. 3, 465–77, 2 maps & 5 figs. on 1 pl.

The paper describes a successful eradication of *G. palpalis* from a narrow water-side fly belt, by catching with nets.

The authors worked on the river Sari in South Kavirondo, Kenya. About sixteen miles of river was infested with *G. palpalis*. They isolated two stretches of river-side vegetation by removing light bush, and used them for experiment and control. The two stretches were thus isolated by clearings of 5,000 yards or over. In one area of infested bush (3,800 yards long ; about fifteen yards wide on each bank), fly-rounds were carried out for three months, and showed about sixty " total flies per 10,000 yards." Then ten teams of fly boys (three in each team, with a hessian screen) were brought in to catch flies : this is equivalent to two teams per 1,000 yards of stream. In the first six months they caught 282, 84 and 33, 2, 4 and 1. Meanwhile the standardized fly-round figure fell from about sixty to six or lower from the first month of catching. Further study, including intensive attempts to catch flies, repeatedly showed no evidence of reinfestation up to seventeen months.

Meanwhile, in the other isolated stretch of fly-bush, where catching had not been undertaken, *G. palpalis* continued to be common.

Investigations were also carried out in the area in which SYMES and VANE [see this *Bulletin*, 1937, v. 34, 542] carried out the first " catching out " experiment, which had appeared successful and seemed to have controlled human trypanosomiasis. These areas had only been isolated by riverside clearings of about 1,000 yards. Reinfestation had occurred, though the density of the flies was very low [which seems to suggest a *recent* reinvasion].

In conclusion, the authors emphasize that hand-catching speedily reduces *G. palpalis* to a low figure, and would therefore be expected to check an epidemic. They state that it is much cheaper than clearing. [It is essential to give cost in money, and man days, in describing work of this type, and to state what items are included or excluded from the figures. The authors refer several times to cheapness in a purely qualitative way.] *P. A. Buxton*

LEISHMANIASIS

HEILIG, R. & SACHDEV, R. N. **Kala-Azar in Jaipur.** *Indian Med. Gaz.* 1947, June, v. 82, No. 6, 336–9.

It is generally agreed that the incidence of kala azar, which is high in Eastern India, declines rapidly as one traces its extension westwards, but authors show differences of opinion on its westerly limit. Jaipur is in any case outside the recognized endemic area.

The authors report nine cases and claim that their report " confirms the experience that wherever one looks for kala-azar, one shall find some ". The cases were selected on account of positive aldehyde tests and enlarged spleens.

In two cases, leishmaniae were found by sternal puncture, in a third the sternal-puncture findings were " doubtful ", and in three others negative. In the doubtful case and in two of the three negative cases, there was strong clinical evidence, including response to antimony, to support the diagnosis of kala azar. However, each of these five patients, in whom there was unequivocal or strong evidence of kala azar, had lived at some time in a recognized endemic area, three within a year of, one eighteen months before and one seven years before coming under observation : the last two were the patients in whom leishmania were found. Of the other four patients, in whom the evidence was limited to a large spleen and liver and a + + aldehyde reaction, three had never left Jaipur and one was a nomad.

The authors conclude " We are unable, therefore, to make a definite statement whether kala-azar of undoubted Jaipur origin exists, being not sure whether a fully positive aldehyde test, not corroborated by the presence of Leishman-Donovan bodies in sternal smears, is sufficient for establishing this diagnosis ".

[The aldehyde test is of great value in a highly endemic area, especially for out-patient use when large numbers of patients are involved, and in these circumstances a definite positive reaction is sufficiently strong evidence for treatment to be undertaken. It is, however, a non-specific test and the diagnosis should always be confirmed by the demonstration of leishmania if data are to be used for scientific purposes, *e.g.* appraising the value of a specific drug or upsetting preconceived ideas regarding the geographical distribution of the disease.] *L. E. Napier*

ADAMS, A. R. D. & SEATON, D. R. **Intensive Treatment of Kala-Azar with Sodium Antimonyl Tartrate.** *Lancet.* 1947, Oct. 18, 575–6.

Encouraged by the success of ALVES and BLAIR [this *Bulletin*, 1946, v. 43, 344] with intensive administration of sodium antimonyl tartrate in the treatment of schistosomiasis, the authors decided to try this treatment in six cases of kala azar.

Sodium antimonyl tartrate was given intravenously. The total dosage was about 1 grain per 12 lb. of body-weight, divided into six doses given over a period of two days, usually at 9 a.m., noon, and 3 p.m. A 2 per cent. solution

was used and the injection was made up to 15 to 20 ml. by the addition of normal saline ; this was given very slowly. Most patients had paroxysms of coughing, leading to vomiting in a few instances, and one patient developed toxic jaundice two days after the injections. One developed pneumonia as a complication.

Three patients were Indian seamen and three were Englishmen who had served in India during the War. The three Indians responded well to treatment and were apparently cured but were not followed up. Of the three Englishmen, one was cured with a single course : he was known to be well five months later ; one responded well to the treatment, but within three months the symptoms recurred and he still had leishmania in his sternal puncture material ; he was apparently cured by a second course. The third was quite unaffected by the treatment : he was subsequently successfully treated with pentamidine.

The authors conclude that, although the treatment does not compare with that by neostibosan, urea stibamine, or the diamidines, where a rapid course is required and cost is an important consideration, this treatment might be recommended, since this course occupies two days only against 8, 30, and 12 days, respectively, and the cost is less than that of any of them. *L. E. Napier*

NAPIER, L. E. **Intensive Treatment of Kala-Azar with Sodium Antimonyl Tartrate.** [Correspondence.] *Lancet.* 1947, Dec. 20, 928.

In a letter to the *Lancet*, referring to a paper by ADAMS and SEATON see above, the reviewer pointed out that he had used sodium antimonyl tartrate in the treatment of leishmaniasis since 1917, until 1923 almost exclusively, since there was no better drug available. For the relatively high mortality, which was the rule among patients under treatment for kala azar in those years, sodium antimony tartrate could not be exonerated from responsibility. If therefore experiments were to be made in concentrating the course of treatment he thought that one of the benign pentavalent compounds should be chosen rather than this relatively toxic trivalent salt. The only justification for the choice of sodium antimony tartrate was its extremely low cost. *L. E. Napier*

HABIBI. Quelques formes cliniques du bouton d'Orient observées en Iran. [**Some Clinical Forms of Oriental Sore in Iran.**] *Cahier Méd. Union Française.* Algiers. 1947, Oct., v. 2, No. 13, 607–9, 12 figs.

A note, with photographs of 12 cases.

GOLDMAN, L. **Types of American Cutaneous Leishmaniasis—Dermatological Aspects. A Review.** *Amer. J. Trop. Med.* 1947, Sept., v. 27, No. 5, 561–84, 12 figs. [33 refs.]

Cutaneous leishmaniasis is a disease of some importance to North American dermatologists on account of the frequency with which isolated cases appear at dermatological centres, and also because it exhibits certain features of special interest to those studying the immuno-biology of the skin.

The development of cutaneous leishmaniasis can be expressed as follows :—

Inoculation ⟶ papule ⟶⟵ ulcer ⟶ scar

A simple general classification for primary American cutaneous leishmaniasis is :—

I Cutaneous : II Mucosal, (*a*) primary, (*b*) metastatic : III Mixed.

The author, however, prefers Rabello's classification :—

I Cutaneous

A. Ulcerative : (i) impetiginoid, (ii) ecthymatoid, (iii) true ulcer.

B. Non-ulcerative : (i) nodular dermal, (ii) vegetant, (*a*) framboesoid or (*b*) verrucose.

II Subcutaneous (" pro parte ")
A. Non-ulcerative
B. Secondary ulcerative
III Mucosal
A. Vegetant—non-ulcerative
B. Vegetative—ulcerative
IV Mixed : various combinations of above.

The special character of American cutaneous leishmaniasis is mucosal involvement. This is of two types, primary or by direct extension from a cutaneous lesion, and metastatic. The mucosal lesion does not occur in Mexico, it is uncommon in Costa Rica, but common in Peru. Extensive lesions resulting from neglect of early metastatic mucosal infections are common in adults, in contrast to the cutaneous lesions which are commoner in children over the age of six months. Weiss gives the frequency of mucosal involvement in Peru as from 20 to 80 per cent. according to the region. Mucosal lesions are usually in the respiratory tract, especially the nasal septum.

Clinical diagnosis is always difficult. The location of the lesion on an exposed part of the body, the chronicity, and the response to antimony treatment help clinical diagnosis. In differential diagnosis, gummata, chronic pyodermias of the tropical ulcer type, cutaneous diphtheria, artefactal lesions, and the infectious granulomata have to be taken into consideration. The last-named includes sporotrichosis, blastomycosis, chromoblastomycosis, paracoccidioidosis, yaws, syphilis, granuloma inguinale [granuloma venereum], rhinoscleroma, lupus vulgaris, leprosy, and stasis syndrome.

Parasitological diagnosis is also difficult. Smears are best obtained by pipette aspiration at the periphery of the lesion. Culture on N.N.N. medium can also be obtained by this procedure. Casual scraping of the lesion is useless. Histological study of biopsy material is of little value : non-specific inflammatory and tuberculoid reactions are observed, and only rarely are intracellular parasites identified by this means.

The author discusses the inter-relationship between Old World and New World cutaneous leishmaniasis or visceral leishmaniasis and the factors which bring about the variations in the clinical types of American leishmaniasis. These include virulence of the organsim, vector relationships, tropism, secondary infections and natural and acquired constitutional factors. He considers that there are great opportunities for investigation in this direction.

Treatment is reviewed, but no special recommendations are made, and there is a paragraph on prevention.

It is a stimulating article, if somewhat untidy and quite inconclusive. It should be read in the original by those especially interested in this disease.

There are a large number of excellent photographs illustrating the types of cutaneous leishmaniasis and the conditions from which it must be distinguished.

L. E. Napier

FEVERS OF THE TYPHUS GROUP

HOTTLE, G. A. & SHEPARD, C. C. **Effect of Egg Yolk on Release of Antigen from Rickettsiae.** *Proc. Soc. Exper. Biol. & Med.* 1947, Oct., v. 66, No. 1, 146–8. [12 refs.]

" The addition of as little as 2·5 per cent. egg yolk to suspensions of yolk sacs infected with the rickettsiae of epidemic and endemic typhus fever, Rocky Mountain spotted fever, and rickettsialpox (*R. prowazeki*, *R. mooseri*, *R. rickettsii*, and *R. akari*) prior to treatment with ether has resulted in antigens with enhanced titers as measured by the complement fixation test."

CHEVÉ, J., COURDURIER, J. & SAISSAC, R. Typhus de laboratoire. Intérêt des épreuvres de contrôle pour le diagnostic des maladies inapparentes. [**Laboratory Typhus. The Use of Control Tests for the Diagnosis of Inapparent Attacks.**] *Bull. Soc. Path. Exot.* 1947, v. 40, Nos. 9/10, 315–16.

Among 60 laboratory workers exposed every day to risk of infection, 12 suffered from recognizable attacks which were confirmed by Giroud's intradermal reaction and by rickettsia-agglutination tests. Four inapparent attacks were detected by the same means.

All the workers had been protected by the Durand-Giroud vaccine. Rickettsiae could not be recovered from any of the patients. *John W. D. Megaw*

FERRO-LUZZI, G. & FERRO-LUZZI, S. **Therapeutic Study on Louse Borne Typhus.** *Boll. Soc. Ital. di Med. e Igiene Trop.* (Sez. Eritrea). 1947, v. 7, Nos. 1/2, 5–23, 2 figs. [25 refs.]

The authors have carried out tests of 17 special methods of treatment of typhus fever, of which they have observed 2,480 cases in a hospital in Eritrea during a period of about eight years commencing in February, 1939; half of the patients were employed as controls.

The treatments tested included most of those for which claims of efficacy have been made, but they did not include *para*-aminobenzoic acid, which was not available.

No significant benefit was observed except in the case of aspirin which was given in divided doses amounting to 4·0 to 8·0 gm. daily.

Among 95 patients treated with the drug only two died, and one of these was moribund on admission. The fatality rate among the controls was 14·8 per cent. The average duration of the fever among the treated was 11·1 days; among the controls it was 14·8 days. Complications and untoward effects among the treated were 23·8 per cent., and 20·2 per cent. among the controls. A striking improvement is said to have occurred in nearly all the treated patients soon after the commencement of the treatment.

[In view of many disappointments in the past, it is necessary to subject the methods of control to a close scrutiny; on this point the evidence supplied in the paper is incomplete and conflicting.

It is stated that "As far as possible the treatments were tried in alternate cases", but a little later the authors mention that selection of cases for treatment was governed "by the two following criteria, early stage of illness and high degree of severity". It also appears that the same group of patients formed the controls for tests of aspirin and three other drugs. Detailed information is given of only two groups of patients, those receiving 4·0 gm. aspirin daily, and those receiving 8·0 gm. daily; from this it appears that in the former group, consisting of 40 patients, only one was over 30 years old and in the latter, consisting of 55 patients, no less than 20 were over 30.

In view of the above evidence, the method of control cannot be regarded as satisfactory, and as aspirin was the last method tested it seems possible that the drug was tried towards the end of the epidemic season, though the authors state that the average severity of the attacks was much the same in the first as in the second half of the epidemic period during which aspirin was tested.]

John W. D. Megaw

NELIS, P. La prophylaxie du typhus exanthématique en Belgique de 1940 à 1946. [**The Prophylaxis of Exanthematic Typhus in Belgium from 1940 to 1946.**] *Arch. Belges Méd. Sociale, Hyg., Méd. du Travail et Méd. Légale.* 1946, Aug., v. 4, No. 6, 298–315.

The interest of this article is chiefly historical. The systematic application of effective methods of control was remarkably successful in preventing any serious outbreaks of typhus fever in Belgium in spite of the repatriation of 284,000 Belgians from Germany and the passage through the country of a larger number of persons of other nationalities who also came from Germany.

The total number of cases in 1944 was 10, of which 7 occurred in one infected focus. In 1945, there were 140 cases, but no less than 133 of the patients arrived in Belgium within the incubation period of the disease.

The author claims that the chief lesson to be learned from the success of the preventive measures adopted is the supreme importance of an organization based on a fully staffed and well-equipped laboratory. *John W. D. Megaw*

FLOCH, H. & CAMAIN, R. Sur les fièvres typhoexanthématiques en Guyane Française. [**Typhus Fevers in French Guiana.**] *Institut Pasteur de la Guyane et du Territoire de l'Inini. Publication No. 156.* 1947, July, 4 pp.

In reporting a case of fever of the typhus group in 1941 (Publication No. 10, March 1941), the authors, working in the Pasteur Institute of French Guiana, concluded that these fevers did not constitute a simple problem in Guiana. They have therefore carried out systematic Weil-Felix tests from 1940 to the early part of 1943 on 3,732 sera submitted to the Pasteur Institute mostly for sero-diagnosis for syphilis and on 699 sera sent for Widal reactions.

The suspensions tested were *Proteus* OX19 Metz and Syria and Kingsbury, H. and O. The first 2,438 of the 3,732 sera tested at a dilution of 1/50 gave 99 (4 per cent.) positive results : the remaining 1,294 at 1/100 gave 29 (2 per cent.) : there were thus 128 (3 per cent.) positives by these criteria.

High titres were rare ; and the positive results fell into two groups, namely those in which agglutination occurred with *Proteus* Metz and Syria only, and those in which agglutination with the Kingsbury variants also occurred. The first group constituted 57 per cent. and the second 43 per cent. of all positive findings.

Among the 699 sera sent for Widal reactions, in febrile patients, 25 (4 per cent.) agglutinated the various *Proteus* suspensions at a titre of 1/100 : this is about twice the percentage which was found in the case of sera of non-febrile patients.

The authors then describe a case of fever in a European aged 30, which clinically resembled one of the typhus group. All the agglutination tests were negative, except that against the Syrian strain of *Proteus* OX19, which was positive 1/300. The authors therefore examined the patients' serum further by the rickettsia agglutination technique of Giroud, with formalinized suspensions of murine and epidemic strains. This test was positive 1/5,000 with the murine and 1/2,000 with the epidemic strain : a later specimen examined by Dr. Giroud gave titres of 1/2,560 (and 1/5,120±) for the murine and 1/300 (and 1/640±) for the epidemic strain.

Many rats were found in broad daylight in the patient's house, especially in the kitchen. The authors therefore confirm that murine typhus exists in French Guiana, especially in Cayenne, and that another fever of the typhus group, possibly tick-borne, is also present. *H. J. O'D. Burke-Gaffney*

VARELA, G. & MAZZOTTI, L. Dos mamiferos *Dasypus novemcinctus* y *Neotoma fuscipes canescens* susceptibles al tifo murino. [**Infection of** *Dasypus novemcinctus* **and** *Neotoma fuscipes canescens* **with Murine Typhus.**] *Rev. Inst. Salubridad y Enfermedades Trop.* Mexico. 1947, June, v. 8, No. 2, 125–7.

By means of guineapig experiments the authors, working in Mexico, were able to produce experimental infection with murine typhus of the armadillo, *Dasypus novemcinctus* and the field rat *Neotoma fuscipes canescens*.

H. J. O'D. Burke-Gaffney

RAYNAL, J. H. Le chat dans l'épidémiologie du typhus exanthématique murin. [**The Cat in the Epidemiology of Murine Typhus Fever.**] *Bull. Soc. Path. Exot.* 1947, v. 40, Nos. 9/10, 367–75. [13 refs.]

Murine typhus infection was detected in three out of 25 cats examined in Shanghai during 1942, which was a year of exceptional prevalence of typhus fever among the human and rat population.

The author suspects that human beings who come into close association with cats may occasionally become infected through contact with dried faeces of infected fleas harboured by the cats. He thinks, however, that in ordinary conditions cats help to control infection by keeping down the rat population.

John W. D. Megaw

SOUTHCOTT, R. V. **Observations on the Epidemiology of Tsutsugamushi Disease in North Queensland.** *Med. J. Australia.* 1947, Oct. 11, v. 11, No. 15, 441–50, 5 figs. [15 refs.]

Early in this paper, the author states that it is generally accepted that a diagnosis of tsutsugamushi disease should be based on the agglutination of *Proteus OXK* at a titre of 1–160 or, if this level should not be reached, on a rising-titre agglutination [but see the next abstract].

An opportunity occurred of investigating the incubation period of the disease in the Atherton Tableland and the adjoining coastal area of North Queensland. In 34 cases, the date of infection was ascertained ; in 26 of these the incubation period was 11–13 days, in the remaining 8 cases it was 14–18 days. The author concludes that in Australia the period is of the order of 13 ± 2 days.

The effectiveness of dibutyl phthalate as a preventive was strongly suggested by the distribution of the eschars, nearly all of which were on parts of the body not adequately protected by the treated clothing. One of the three cases of typhus seen in the coastal area north of Cairns was diagnosed as North Queensland Tick Typhus.

Evidence was found supporting the view that birds are important in spreading larval mites, and that lizards, in the Cairns region, are a major factor in maintaining the population of the vector mites. *John W. D. Megaw*

HEASLIP, W. G. **Observations on the Epidemiology of Tsutsugamushi Disease in North Queensland.** [Correspondence.] *Med. J. Australia.* 1947, Nov. 1, v. 2, No. 18, 558.

In a letter, HEASLIP challenges the diagnostic criteria referred to in the preceding paper ; he states that in his own experience mouse inoculations have established the diagnosis of rickettsial infection in several cases in which the *Proteus OXK* reaction remained negative ; in one such case, the serum was tested at intervals over a period of 28 days. *John W. D. Megaw*

KHAN, N. **Early Diagnosis of Tsutsugamushi.** *Indian Med. Gaz.* 1947, July, v. 82, No. 7, 381–3.

"The difficulties in the early diagnosis of scrub typhus are emphasized but certain signs and symptoms, *viz.*, headache, lethargy and apathy; vacant expression; stare of the eyes; deafness of the nerve type; hypopiesis, fundal changes and blood picture and early morning remissions are helpful."

SNYDER, F. M. & MORTON, F. A. **Benzyl Benzoate-Dibutyl Phthalate Mixture for Impregnation of Clothing.** *J. Econom. Entom.* 1947, Aug., v. 40, No. 4, 586–7.

Experiments previously reported [this *Bulletin*, 1946, v. 43, 1196] indicated that benzyl benzoate and dibutyl phthalate are both good repellents for use against the mite *Eutrombicula* and related genera. The former compound appeared to be slightly more effective than the latter, but in view of supply difficulties, tests were done with a 50 : 50 mixture of the two, in order to see if this would be adequate.

Experiments showed that the 50 : 50 mixture was nearly as good as the pure benzyl benzoate in "mite stopping time" and in practical repellence trials, and somewhat more persistent in an ageing test. *J. R. Busvine*

BUSTAMANTE, M. E. & VARELA, G. IV. Estudios de fiebre manchada en Mexico. Papel del *Rhipicephalus* sanguineus en la transmisión de la fiebre manchada en la República Mexicana. [**Studies of Rocky Mountain Spotted Fever in Mexico.**] *Rev. Inst. Salubridad y Enfermedades Trop.* Mexico. 1947, June, v. 8, No. 2, 139–41, 1 map. English summary (3 lines).

The authors were able to produce typical and specific experimental infections of Rocky Mountain spotted fever in guineapigs inoculated with material from injected *Rhipicephalus sanguineus* collected from different parts of Mexico. They conclude that this tick plays an important rôle as a vector of *R. rickettsi* in that country. *H. J. O'D. Burke-Gaffney*

TENDEIRO, J. Ixodídeos da Guiné Portuguesa. Subfamília *Amblyomminae* Neveu-Lemaire 1938. [**The Ticks of Portuguese Guinea: Sub-family *Amblyomminae*.**] Reprinted from *Bol. Cultural da Guiné Portuguesa.* 1947, July, No. 7, 617–709, 31 figs. [22 refs.]

This paper is largely of interest other than medical, but there is a full description of *Haemaphysalis leachi*, which is considered by THEILER to be a vector of Tick-bite fever. *H. J. O'D. Burke-Gaffney*

YELLOW FEVER

STEFANOPOULO, M. G. J. & DUVOLON, S., Mlle. Sur l'utilisation du cobaye dans l'étude expérimentale du virus de la fièvre jaune et en particulier du virus atténué de culture (souche 17 D). [**Use of the Guineapig in the Study of Yellow Fever Virus, especially Attenuated Strains.**] *Bull. Soc. Path. Exot.* 1947, v. 40, Nos. 7/8, 285–94, 7 text figs. & 4 figs. on 2 pls. [15 refs.]

During the recent war, the authors undertook this study of the effect of various strains of yellow fever virus in the guineapig because of the scarcity of monkeys which are commonly used in testing the neurotropic properties of batches of yellow fever vaccine.

It was found that the attenuated 17D virus (used for vaccine) killed about 40 per cent. of guineapigs when inoculated intracerebrally ; animals weighing less than 350 gm. were more susceptible than heavier ones. Ten passages of the vaccine virus through mouse brain, followed by 7 to 16 passages in chick embryos, failed to increase the virulence of the virus. In addition to those animals which died, some developed paralysis and recovered and others had an inapparent infection which was detected either by reinoculation with virulent virus or by testing for neutralizing antibodies in the blood.

The histological lesions resembled those found after inoculation with the neurotropic strain of yellow fever, but the latter virus produced a more rapidly progressive illness with a mortality of nearly 100 per cent. Thus, the guineapig may be used to detect potential neurotropism of the attenuated 17D vaccine virus. However, the rhesus monkey remains the most suitable animal for this purpose, for it is also capable of detecting return of the attenuated virus to full viscerotropism. *F. O. MacCallum*

HERRERA, G. & PARDO, V. **A New Method for Biopsy of the Liver.** *Arch. Pathology.* 1947, Oct., v. 44, No. 4, 393–5, 1 fig.

" A method of obtaining liver for biopsy is described which makes it possible to obtain a cylinder of tissue as long as the distance covered by the trocar in the liver and of the same thickness as the diameter of the trocar. A wire loop at the end of the trocar is an essential feature of the instrument.

" The trauma is minimal ; abundant tissue is obtained in every case.

" We have obtained biopsy specimens from 72 patients without a single hemorrhage or other complication."

DE CAIRES, P. F. **DDT and *Aëdes aegypti* Control in British Guiana.** *Puerto Rico J. Pub. Health & Trop. Med.* 1947, June, v. 22, No. 4, 405–15, 5 figs. [Spanish version 416–24.]

British Guiana is the last place of call of northbound air and sea traffic from South America. The control of *Aëdes aegypti* in the thickly populated coastal zone, as a yellow fever preventive measure, is rendered very difficult by the complex system of rainwater storage for drinking purposes. A controlled experiment on familiar lines was carried out to determine the efficacy of DDT applied as a residual insecticide. That the very domestic *Aëdes aegypti* is most susceptible to 5 per cent. DDT in kerosene is clearly demonstrated in that eradication of the species was attained 13 weeks after the single spraying, and maintained for 10 months. A 2½ per cent. solution was less effective. It is believed that this method applied on a large scale will be more economical than routine anti-*aëdes* measures of control. [See also this *Bulletin*, 1946, v. 43 1136 ; 1947, v. 44, 658, 994.] *R. Ford Tredre*

DENGUE AND ALLIED FEVERS

LE GAC, P. La ponction lombaire : thérapeutique de blocage de la dengue. [**Lumbar Puncture as a " Block " Treatment of Dengue.**] *Bull. Soc. Path. Exot.* 1947, v. 40, Nos. 9/10, 336–9, 5 charts.

The author and SERVANT [this *Bulletin*, 1940, v. 37, 273] have already reported that lumbar puncture at any stage of an attack of dengue was found to cause the immediate and complete disappearance of the signs and symptoms of the disease.

The present study deals with the employment of the same treatment in " a certain number " of cases of dengue in East Africa, with similar happy results. Five charts are reproduced showing in each case a rapid fall of the temperature.

[Although the relief of symptoms by decompression is not surprising the complete arrest of the febrile process in a virus disease is truly remarkable. In view of the wide range of variation that is known to occur in the duration and severity of attacks of dengue, a fully controlled test of the treatment ought to be carried out. The author describes dengue as a fever lasting eight to nine days with two paroxysms of fever, unbearable headache, and invariably followed by a long period of weakness and depression ; but short " one-phase " attacks and rapid recovery are common in certain outbreaks.]

John W. D. Megaw

PLAGUE

BURROUGHS, A. L. **Sylvatic Plague Studies. The Vector Efficiency of Nine Species of Fleas compared with** *Xenopsylla cheopis*. *J. Hygiene*. 1947, Aug., v. 45, No. 3, 371–96, 3 figs. on 2 pls. [59 refs.]

This study, which has sylvatic plague as its background, is primarily concerned with an expression of the vector efficiency of the flea ; *Xenopsylla cheopis* is used as the basis of comparison. This flea and the domestic rodents, and not the wild rodent reservoir, are considered to be the agents responsible for bringing plague into contact with human beings. The fleas studied were :— *X. cheopis, Diamaus montanus, P. irritans, Oropsylla idahoensis, Nosopsyllus fasciatus, Echidnophaga gallinacea, Orchopeas sexdentatus sexdentatus, Opisodasys nesiotus, Megabothris abantis, Malaraeus telchinum,* and their hosts are noted.

In the United States, up to the present, only 66 cases of plague infection in man have been traced to sylvatic rodents. In the present paper, in addition to the main subject matter, that of numerical expression of vector efficiency, there is a well-balanced historical recapitulation of our knowledge of plague bionomics. Much of this is based on the valuable accounts and documentation of the Indian Plague Research Commission. [It may be well to recollect that there was an earlier British Commission, a Royal Commission 1898–99, of which the medical members were Sir Thos. Fraser, Sir Almroth Wright and Armand Ruffer.]

A great deal of preliminary work on the rat and rat flea was done before the main plague Commission got to work. References are made in the present communication to the experimental establishment of the fact of mass transmission experiments from rat to rat by fleas (Simond, 1898) ; to Liston's work on the relationship between rat-fleas and man (the first public communication of which is recorded in the *Transactions of the Bombay Medical and Physical Society*, February 1903) and, possibly more dramatic, the demonstration in 1903 of plague bacilli in the proventriculus of the rat flea fed on infective blood ; to the conclusion of the Plague Commission (1906) that transmission of infection by a single flea was only remotely possible. Many other facts of the history of plague are brought to mind in the article, such as the comparison of the efficiency of *X. cheopis* and *X. astia* ; the check on the advance of an epidemic when the mean daily temperature attains 80°F., if accompanied by a saturation deficiency (Brooks, 1917) of over 0·3 in. ; that classical work, the first demonstration by Bacot and Martin (1914) of proventricular block by plague bacilli in the rat flea ; the distinction between pestigenous and pestiferous fleas, and so on.

We may leave this interesting historical account and proceed to the subject matter proper. WHEELER & DOUGLAS [this *Bulletin*, 1946, v. 43, 35] presented an experimental method of measuring numerically the vector efficiency of a flea

species in terms of infection potential, vector potential and transmission potential. According to Burroughs, the vector efficiency thus obtained represents only an approximation to natural efficiency and he points out that this is inevitable because ignorance of ecology precludes the duplication of natural conditions. He uses the well-known statistical formula $\bar{X} \pm K\alpha\sqrt{\frac{S^2}{N}}$ in order to find the range within which the true value probably lies; "to estimate the expected number of mice killed (total number of daily transmissions) per flea . . . where X is the average number of transmissions per flea for the entire number of fleas studied, N the total number of fleas used in the studies," and α "the probability that the estimating interval covers the true value." In this way, it was found that the true vector efficiency, with a confidence of 90 per cent., of important fleas could be given as:—*Xenopsylla cheopis* 0·660±·234, *Nosopsyllus fasciatus* 0·213±0·157, *Orchopeas sexdentatus sexdentatus* 0·170±0·138, *Diamanus montanus* 0·02±0·02. The low value and inefficiency given to this last flea, which is grouped with *Opisodasys nesiotus*, *Megabothris abantis* and *Malaraeus telchinum*, is not supported by the work of Wheeler and Douglas [*loc. cit.*] who regard it as an exceptionally good vector (0·840±0·232) and more efficient than *X. cheopis*. This, it is suggested by Burroughs, may be due to a difference of strains collected in a widely separated geographical area.

Among the several conclusions is one of considerable interest; "The order of importance of transmission by fleas is the following: (*a*) By the blocked flea serving as a biological vector. (*b*) Mechanical transmission which undoubtedly is of considerable importance during an epizootic. (*c*) By the infected flea or its faeces being scratched into the skin. (*d*) By the ingestion of fleas harbouring plague bacilli. Infection by the latter two methods is undoubtedly rare and of minor importance." *W. F. Harvey*

Hopkins, G. H. E. **Annotated and Illustrated Keys to the Known Fleas of East Africa.** Reprinted from *Uganda J.* 1947, Sept., v. 11, No. 2 (Scientific Suppl.), 133–90, 146 figs. on 21 pls. [35 refs.]

The species of fleas dealt with in this paper are those occurring in Kenya, Tanganyika, Uganda and Zanzibar. Rather less is known about the fleas of Tanganyika than of those of the other territories. With the exception of the common poultry flea (*Echidnophaga gallinacea*), there seems to be an absence of indigenous bird fleas in spite of the fact that many nests have been examined.

The worker is urged, when using the keys, to have his provisional identifications checked by a specialist except in the case of the commonest fleas. Most of the characters used for identification are shown in a diagram and the important morphological details for distinguishing species are figured. In addition to the keys, there are notes on characters for separating closely related forms, on bionomics, the technique of collecting, preparation for study, preserving and on control. The index contains the names of 25 genera and over 80 names of species and subspecies. *H. S. Leeson*

McDougall, W. A. **An Investigation of the Rat Pest Problem in Queensland Canefields: 5. Populations.** *Queensland J. Agric. Sci.* 1946, Dec., v. 3, No. 4, 157–237, 10 figs. (1 map), & 3 pls. [41 refs.]

This monograph, the fifth of a series, is concerned largely with the trapping of rats, especially *Rattus conatus*, in estimating rat populations. It is largely of agricultural interest, but in discussing the influence of disease on population fluctuation in rats, the author notes that bubonic plague in Queensland in 1921–22 did not appear to have any effect on cane rat population trends at

the time; and that *Leptospira icterohaemorrhagiae* was shown to be non-pathogenic to *R. conatus* from canefields. It is concluded that weather is the prime factor governing survival and fluctuations.

H. J. O'D. Burke-Gaffney

WAGLE, P. M. & COLAH, R. B. M. **Prognostic Significance of Leucocytic Count in Bubonic Plague.** *Indian Med. Gaz.* 1947, July, v. 82, No. 7, 399–402, 1 chart.

There were 446 cases of bubonic plague treated with sulphonamides, and analysis was made of the leucocytic reaction and its correlation with both septicaemia and death rate. All those suspected of showing the hyper- or hypo-leucocytosis of toxic sulphonamide action were excluded from the series. Where more than one count was made on a patient, the highest result was used for the calculations. If a total count of 5,000 to 10,000 leucocytes per cmm. be taken as more or less normal level, the curious fact emerged that this proved to be an optimum condition for prognosis—17·7 per cent. mortality for 79 cases. Three of 6 patients with a count of less than 5,000 died, and mortality in the opposite direction mounted steadily to 97·3 per cent. for a count of over 40,000. The authors think that the counts below the normal base level indicate lack of resistance, and above that level, the degree of reaction was highly correlated with degree of septicaemia. At the same time, septicaemia occurring with a normal leucocyte count was of grave prognosis and was, in fact, a manifestation of lack of resistance. The degree of septicaemia, which is the main factor determining the severity of plague infection, was determined by colony counts of drawn blood sown on agar slopes. Mortality rates of the 446 cases worked out at 7 per cent. for the non-septicaemic, 54·9 per cent. for the septicaemic, 21·8 per cent. for the mild septicaemic and 65·8 per cent. in severe cases.

W. F. Harvey

AMOEBIASIS AND INTESTINAL PROTOZOAL INFECTIONS

ALKAN, W. **Amoebiasis as seen during 18 Months with a Military Hospital.** *Harefuah.* Jerusalem. 1947, Nov. 2, v. 33, No. 9. [In Hebrew 143–6 (13 refs.) English summary 146.]

The author describes 66 cases of amoebiasis seen in 18 months among 4,995 patients, mostly Indians in hospital in Greece and Italy. Dysenteric, hepatic and cutaneous forms and the carrier state are reviewed. Many cases were easily mistaken for simple intestinal conditions: cysts were found in only 14 cases. The author advocates "reasonable treatment" of every patient infested with *E. histolytica* owing to the inherent danger of apparently inconspicuous infections, the absence of a sharp demarcation between infestation and infection and the apparent general increase in amoebiasis. All the usual diagnostic methods are recommended, but treatment, on the whole, was not found to be quite satisfactory. The author finds emetine to be useful only in combating acute symptoms, but it was of value in the treatment of extra-intestinal complications. For the dysenteric form, the other recognized drugs are recommended. The psychological factor in treatment is of importance: whatever form of treatment is adopted, relapses are common.

H. J. O'D. Burke-Gaffney

CALVÓ FONSECA, R. La incidencia de la *E. histolytica* en Cuba. [**The Incidence of *Entamoeba histolytica* Infection in Cuba.**] *Kuba.* Habana. 1947, Oct., v. 3, No. 10, 220–24.

The author reviews the findings which have been recorded by various investigators into the prevalence of infection by *E. histolytica* in Cuba. As a result of examination of 38,091 specimens of faeces from persons in 6 Provinces and 126 Municipalities, the general incidence was found to be 2·2 per cent., with lower and upper limits of 0·31 and 6·74 per cent. Going into the question more thoroughly, the author studied the reports from various countries of South America and found that the methods employed varied widely; some examined one slide only, others more; some after a saline purge had been given, others not—in short, there was no uniformity and the results were, in consequence, not really comparable.

The author, therefore, proposed, and the Section of the Medical Congress held in December, 1946, supported, the resolution, that some standard should be adhered to, and four points were decided upon: (1) That the number of specimens should be more than one, if the first proved negative, and that, under these conditions, examination should be made after administration of a saline purge. (2) That the number of persons examined should be at least 2 per cent. (better 5 per cent.) of the population. (3) That, whether urban or rural, a fair cross-section of the social groups should be included and, for this purpose and to include both sexes, those attending school between the ages of 6 and 18 years would be best. (4) Method of examination: (i) The preparation should be a thin one, with physiological saline as diluent; (ii) another preparation should be examined, diluted with Lugol's iodine; (iii) a Gram-stained preparation for searching for protozoa and cysts should be made; (iv) a specimen should be examined by Faust's concentration method, as modified by OTTO, HEWITT and STRAHAN [this *Bulletin*, 1941, v. 38, 473].

[This method may not find recommendation from all, but there is much to be said for some standard procedure in order that results reported by investigators in different countries can be compared.] *H. Harold Scott*

CONVERS, F. El examen radiologico en los abscesos amibianos del higado. [**Radiology in (Diagnosis of) Amoebic Abscess of the Liver.**] *Rev. Facul. de Med.* Bogotá. 1947, June, v. 15, No. 12, 727–53, 31 figs.

An interesting series of X-ray photographs showing the presence of liver abscess, with notes on each of eleven cases out of 50 which the author has had under his observation and care in Colombia. In all, the right lobe was involved; in many cases the X-rays established a suspected diagnosis; in others they revealed an abscess when there had been no suspicion of such. Injection of air, after puncture, the author found very useful in defining the limits of the abscesses. Eight of the cases noted were treated by puncture and administration of emetine; the other three showed enlargement of the liver, but in one only a small collection of pus, and the condition cleared up after administration of emetine, without operation. *H. Harold Scott*

MORTON, T. C. & SOUTAR, S. F. **Amoebic Abscess of the Left Buttock in a Symptomless Cyst Carrier.** *Brit. Med. J.* 1947, Dec. 20, 996–7.

A case of amoebic ulceration of the buttock in a symptomless cyst-carrier is described. The patient had previously been kicked on the same area during a football match so that there had been a local injury. About one and a half years later, a fluctuating swelling appeared containing pus infected with

staphylococci. After incision and penicillin treatment the discharge continued unabated and fresh sinuses had appeared. Further incisions were made and eventually in curettage material active *E. histolytica* were obtained. *E. histolytica* cysts were also present in the faeces. Improvement rapidly took place as a result of emetine therapy (1 grain intramuscularly for ten days) and diodoquin. When the sinuses were opened they were found to communicate with each other like an extensive rabbit warren ; it appeared that " after reaching the deeper layers of the epidermis, the parasites tended to advance along the plane of least resistance between the epidermis and the cutis " [NGAI and FRAZIER, *Chinese Med. J.*, 1933, v. 47, 1154]. No amoebic lesions were discovered by sigmoidoscopy.

The methods by which the abscess may have arisen are considered :—(1) By invasion through the blood stream ; (2) by invasion from the rectum ; (3) by secondary infection with *E. histolytica* in a discharging staphylococcal abscess. The last appears to be the most reasonable explanation.

P. Manson-Bahr

CHAUDHURI, R. N. & CHAKRAVARTI, H. **Treatment of Amoebic Liver Abscess with Secondary Infection.** *Indian Med. Gaz.* 1947, July, v. 82, No. 7, 379–80.

Successful treatment of a case by repeated aspiration and penicillin locally and systemically.

See also p. 259, MONTESTRUC, RAGUSIN & CAUBET, **Etiologie des dysenteries à la Martinique.**

HIRVONEN, M. **Do Sulphonamides possibly have any Effect on Balantidium Coli ?** *Ann. Med. Intern. Fenniae.* 1947, v. 36, No. 2, 274–6.

The author reports one case of *Balantidium coli* infection, which was rapidly and completely relieved solely by the application of sulphathiazole treatment. In his opinion, this case encourages further studies.

H. J. O'D. Burke-Gaffney

HELMINTHIASIS

GORMAN, S., MEESER, C. V., ROSS, W. F. & BLAIR, D. M. **The Macroscopic Diagnosis of Urinary Schistosomiasis.** *South African Med. J.* 1947, Nov. 22, v. 21, No. 22, 853–4, 1 fig.

In following up the specific treatment of schistosomiasis it is important to study the viability of eggs being passed : in the case of intestinal forms, the identification of miracidia by some of the " faeces-washing " techniques is a comparatively simple matter. The authors now describe the application of a similar technique to the follow-up of treated urinary schistosomiasis : the technique has proved to be effective where no eggs were seen in slide preparations.

Terminal urine is allowed to stand for a few minutes in a small jar, after which the urine in excess of that required to fill a centrifuge tube is poured off gently. The remainder is poured into a centrifuge tube and spun at low speed for 2 to 3 minutes. Some of the deposit is examined on a slide and the tube containing the deposit is then filled up to a depth of 1½ inches with fresh water [chlorinated or otherwise chemically treated water may immobilize miracidia].

The tubes are placed in a special rack and their fluids are examined with a lens after about five minutes and thereafter at intervals for at least an hour

before the eggs are deemed to be absent or non-viable. The special rack is improvised from a three-stage metal test tube rack, of which the upper two stages are perforated to take test tubes. The space between the top and middle stages is occluded at the back of the rack with a strip of black cardboard. On the front, a cardboard shade is attached with its lower edge level with the top stage. The tubes are placed in the front-row holes, and kept obliquely so that their tips rest against the front edge of the middle stage of the rack. The rack is held at eye-level towards a lighted window : the tops of the tubes are tipped slightly further away from the eyes than their bottom tips. Direct light is thus shaded from the eyes and the fluid itself is illuminated only by indirect light. The miracidia can be seen easily against the dark background with a hand lens : even a single miracidium can be identified in this way. *H. J. O'D. Burke-Gaffney*

MONTESTRUC, E., RAGUSIN, E. & CAUBET, P. Etiologie des dysenteries à la Martinique. [**Aetiology of Dysenteries in Martinique.**] *Bull. Soc. Path. Exot.* 1947, v. 40, Nos. 9/10, 327–32.

Between January 1942 and January 1946, of 17,201 stools examined at the laboratory in the Pasteur Institute of Martinique 89 (½ per cent.) were of a dysenteric or dysenteriform type. In 15 (16·8 per cent.) of the 89, *Schistosoma mansoni* eggs were found ; and *Entamoeba histolytica* was present in only 5 (5·6 per cent.). In March 1946, of 111 Senegalese from Guinea, where *S. mansoni* is rare, 12 were found to harbour this parasite ; 7 of them suffered from acute bilharzial dysentery. The authors consider the infection to have been acquired locally, *Planorbis guadeloupensis* being the vector. *S. mansoni* is therefore an important cause of dysentery in Martinique. Details are also given of a number of common *Shigella* and *Salmonella* strains isolated.

A. R. D. Adams

GALLIARD, H. & NGU, D. V. Recherches sur la specificité parasitaire de *Fasciolopsis buski*. [**Specificity of** *Fasciolopsis buski*.] *Ann. Parasit. Humaine et Comparée*. 1947, v. 22, Nos. 1/2, 16–23. [14 refs.]

Studies on *Fasciolopsis buski* from human, porcine and canine hosts indicate that they are morphologically one and the same species. It is argued that *F. buski* of man and of pigs are not even biologically distinct races and that their dissimilar geographical distribution is explicable on other grounds. Thus in Tonking, the scarcity of *F. buski* in man is probably due to the fact that the plants on which the cysts are formed, *Eichornia crassipes* and *Trapa natans*, are mainly used as animal food and are always cooked if they are used for human consumption.

The dog, however, is thought to be a refractory host as only one was found naturally infected in Tonking. Experimental efforts to infect dogs both by mouth and by transplantation support this belief. *J. J. C. Buckley*

GUTIERREZ, P. D., LOZANO, A. A. & PESIGAN, T. P. **Report of the First Case of Intestinal Heterophyidiasis diagnosed in Life in the Philippines.** *J. Philippine Med. Ass.* 1946, July, v. 22, No. 7, 287–92, 1 fig.

" A case of intestinal heterophyidiasis associated with parasitic cirrhosis of the liver due to *Schistosoma japonicum* with an accompanying ascariasis, ankylostomiasis, and trichocephaliasis is reported here as the first studied case diagnosed in life in the Philippines. Heterophyid eggs were encountered in the feces of the patient on routine stool examinations. The recovery of several

heterophyid adult flukes in the feces of the same patient after a routine chenopodium treatment clinches this important finding. The patient died a year after, of vascular accident, resulting from the rupture of esophageal varices. Scrapings of the small intestines still showed heterophyid flukes, thus confirming definitely our previous findings."

VON BONSDORFF, B. **The Site of Infestation with Fish Tapeworm determined by means of Intestinal Intubation.** ***Diphyllobothrium latum*** **and Pernicious Anemia.** *X. Acta Med. Scandinavica.* 1947, Nov, 25, v. 129, No. 3, 213–33, 9 figs. [10 refs.]

The author has recently discussed the question of localization of *Diphyllobothrium latum* in the human intestine, as a result of information amassed in replies to a questionary [see this *Bulletin*, 1948, v. 45, 198].

He has now carried the matter a stage further by attempting to determine the point at which eggs or proglottides might be found by means of intestinal intubation and aspiration of intestinal contents.

The method employed is described and should be studied in the original: it consisted of a modified duodenal tube: it has certain disadvantages, which are discussed. The tests were made on tapeworm-carriers with and without pernicious tapeworm anaemia and comprised 26 persons: 10 had a normal blood picture; 3 had "non-pernicious" anaemia; 10 had manifest pernicious tapeworm anaemia; and 3 had the last-named condition in spontaneous remission.

The results are shown in a table in the text and full blood and clinical details are given in three other tables. From these, it can be seen that where pernicious T.A. was present, the worm was in the jejunum (95–135 cm. from the mouth), while in non-anaemic persons, those with non-pernicious anaemia and those with remissions of pernicious T.A., the worm was not found before the ileum was reached (up to 334 cm.). It is suggested that when the worm is high up in the intestine, it has an opportunity of impairing the interaction between Castle's extrinsic and intrinsic factors, thus causing a pernicious anaemia [see this *Bulletin*, 1947, v. 44, 1081]. *H. J. O'D. Burke-Gaffney*

HIRVONEN, M. **On the Differential Diagnosis between Pernicious Tapeworm Anemia and Cryptogenetic Pernicious Anemia in Carriers of** *Diphyllobothrium latum.* *Ann. Med. Intern. Fenniae.* 1947, v. 36, Suppl. 2, 39 pp., 29 figs.

The object of the work discussed in this careful and detailed monograph was to help in establishing the differential diagnosis between pernicious anaemia (P.A.) and severe tapeworm anaemia (T.A.) in carriers of *Diphyllobothrium latum*: the question is of special importance in Finland where *D. latum* infection is common and an unjustified diagnosis of pernicious anaemia may involve a patient in a long, anxious and expensive course of unnecessary liver treatment, perhaps for the rest of his life.

The author establishes this differential diagnosis on the basis, firstly, of examining for free hydrochloric acid in the gastric juice: its presence eliminates a diagnosis of P.A., but its absence does not necessarily help the diagnosis. The patient is then given a worm cure, as a first stage, if he can stand it: but if his Hb. percentage is below 25 and his red corpuscles below 1½ million per cmm., this may prove to be dangerous unless liver treatment is first administered: and in fact, such a measure had a fatal result in two of the cases described. After the worm cure, blood regeneration should be studied microscopically: if the blood picture becomes normal on worm cure alone, the case

is one of T.A., and may be so even if this regeneration ceases and only begins again after liver treatment. The pathology of this latter state is discussed, and it is suggested that it may be an intermediary stage between T.A. and P.A. In doubtful cases, the differential diagnosis can only be established by prolonged re-examinations after liver treatment and apparent regeneration of the blood picture. If, on the other hand, the patient's blood state is too low or for other reasons he is too weak to have worm treatment as the first therapeutic measure, and no free HCl is present in the gastric juice, these same prolonged re-examinations are required. Finally, the author makes the important differential point that P.A. hardly ever appears before middle or old age.

The material for these investigations consisted of 34 cases of severe anaemia in *D. latum* infections: these are divided into 3 main groups: (1) the certain T.A.; (2) the differentially uncertain; and (3) the certain P.A.

In group (1) there were 12 patients with free gastric HCl, although in three, and probably four, liver treatment was required in addition to worm cure before blood regeneration became complete. In this group were also 7 patients with no free gastric HCl who nevertheless recovered completely on worm cure alone.

In group (2) there were 5 patients without free gastric HCl who received liver treatment, but whose improvement was maintained even after this treatment was stopped: there were also 6 patients in whom the diagnosis was uncertain because after-examination was not practicable (in two cases, cited above, owing to death).

In group (3) there were 4 certain cases of cryptogenetic P.A.: all occurred in old people and continued liver therapy was necessary: the author considers that the removal of the worm was a side-issue in their treatment.

H. J. O'D. Burke-Gaffney

Mazzotti, L., Rodriguez, L. & Treviño, A. Observaciones en 161 personas parasitadas con *Taenia*. [**Remarks on 161 Cases of Taeniasis.**] *Rev. Inst. Salubridad y Enfermedades Trop.* Mexico. 1947, June, v. 8, No. 2, 155–62. English summary (8 lines).

The authors, during the past three years, have had under observation 161 persons infested with *Taenia*, 141 with *T. saginata* alone, 16 with *T. solium* alone, and 4 with both species. One hundred and thirty received treatment, 15 of those with *T. solium*, all four of those with both infestations and 111 with *T. saginata* only. Most of the patients were in the third decade; the youngest was a girl of 2 years and the oldest was aged 70. In 10 of the *T. solium* cases, eggs were found in perianal smears and in 4 others on the body and on the underclothing. Ninety-five of the patients complained of "nervous disturbances," change of character, irritability, nausea and, rarely, paraesthesiae; 38 suffered from pruritus ani, 29 from abdominal pain.

Three forms of treatment were given, but, as preliminary to all, the patient was put on a semi-solid diet of cereals, gruel, eggs, soft fruits, etc. on the day before, a saline laxative the same evening, a warm water enema the next morning and, before any food was taken, the specific medicament, divided into three doses, was given at half-hour intervals and, 1½ hours later, a saline purge. The patients were divided into three groups: Group I, 59 patients, received ethereal extract of male fern. In 22 the scolex was found, in 37 it was not, but 4 of these did not relapse; this is regarded as a 44 per cent. cure. A second group of 52 was given the oleoresin of male fern, 2–3·5 gm. to adults, 15 cgm. for each year of age to children, in three doses as before, in gelatin capsules. In 42 (80·7 per cent.) the scolex was recovered. A third group of

19 were given pumpkin seeds ; 300 gm. was the total dose, but as this was so large an extract was made with sulphuric ether to remove fats and a watery extract made of the residue, the total dose being 125 cc. In three the scolex was recovered, from 16 it was not, but 7 of the latter did not relapse, the result being reported as 53 per cent. cure. The fact of the ova of *T. solium* being found on the body and underclothes may explain some of the cases of human cysticercosis. *H. Harold Scott*

HOOD, M. **The Present Status of Hookworm Infection in Florida.** *Amer. J. Trop. Med.* 1947, July, v. 27, No. 4, 505–16, 3 charts & 1 fig. [18 refs.]

The importance of hookworm infection as a medical problem in Florida was recognized in 1903. Hookworm campaigns and surveys have been repeatedly undertaken since that date. The first survey, undertaken under the auspices of the Rockefeller Foundation in 1910, showed that 58·1 per cent. of 6,155 persons examined had hookworm infection. In 1926, another survey showed a 56·2 per cent. infection rate. It was at one time assumed that infection and disease were synonymous, but later, by employing counting methods, SMILLIE and AUGUSTINE [this *Bulletin*, 1926, v. 23, 772] showed that only heavy (12,600 and over eggs per ml.) and moderately heavy (2,600–12,599) infections were clinically significant. Persons with light (700–2,599) and very light (200–699) infections did not improve in health significantly after anthelmintic treatment, while those with heavy infections did. A third survey in 1937–38, undertaken by a Vanderbilt group [*ibid*, 1939, v. 36, 828], showed a 34·8 per cent. infection of 29,064 specimens ; of these 11·5 per cent. were classed as moderate or heavy infections.

For the present survey, the zinc sulphate concentration method was used to detect infections and also for estimating intensity. Parallel egg counts by the Stoll and zinc sulphate techniques were made in order to establish a ratio ; as it was shown that 1 to 40 eggs per cover-glass constituted a very light infection, 41 to 150 a light, 151 to 700 a moderate, and 701 and over a heavy infection.

A study of 8,017 white school children showed a marked variation between the counties in both incidence and intensity of infection. Approximately 40 per cent. of the white children have hookworm infection, but only 3·9 per cent. of the whole number, or 10 per cent. of the positive cases, are classed in the moderate and heavy intensity groups.

Very low incidence and intensity of hookworm infection are shown in a group of 1,264 coloured children studied (13·3 per cent. positive).

Hookworm infection is most marked during school age. A sharp diminution in both incidence and intensity is shown about the twentieth year.

Both incidence and intensity of hookworm infection are greater in the western section than in any other area of the State.

It is considered that, although there has obviously been a great reduction in the hookworm incidence in Florida, it is still a public health problem. It is believed that better results will be obtained in anti-hookworm campaigns if all infections are reported according to their intensity so that efforts can be concentrated on groups that show the largest number of moderate and heavy infections. *L. E. Napier*

HERNÁNDEZ LIRA, J. P. Aspecto mexicano en relación con la clínica y el tratamiento de la uncinariasis. [**Ankylostomiasis in Mexico.**] *Medicina*. Mexico. 1947, Nov. 10, v. 27, No. 543, 481–93.

After general remarks on the history of ankylostomiasis and its symptomatology, the author speaks in detail of the methods of treatment used in Mexico.

He mentions various drugs which have been tried from time to time and states that several " accidents " have occurred after administration of oil of chenopodium and of carbon tetrachloride, and in consequence the latter has been discarded altogether, and at the present time only three drugs are used, namely, oil of chenopodium (with 76 per cent. ascaridole), hexylresorcinol, and tetrachlorethylene. The first is specially serviceable because *Ascaris* infestation often accompanies that with hookworm. To children of 3–4 years of age 0·1 cc. is given ; of 5–6 years 0·15 cc., and 7–8 years 0·20 cc., with a purge of castor oil. To those above this age the drug is given in capsules (dosage is graded, adults of 20 years or over receiving 1·25 cc.) and a saline purge is given one hour later. Patients are examined before treatment is given to find out if there are any contraindications ; the drug is given before any food is taken and the patient is kept under observation for 2–3 hours for any signs of absorption. *Hexylresorcinol* is given as chocolate-coated pills of 0·2 gm. each, in doses of 0·07 gm. per year of age ; so children of 6 years are given two pills, or 0·4 gm. ; of 6–8 years three pills, 8–12 years four pills, and those over 12 years five pills or 1·0 gm. No food is allowed for four hours afterwards and a saline purge is usually given. Tetrachlorethylene [the formula is wrongly given as Cl_2C_4, instead of C_2Cl_4] is administered to adults in amounts of 2 cc. in divided doses (3 cc. may be given to powerful adults without harm and proportional doses to younger subjects) followed by a purge of sodium sulphate. If ova were found a week later the dose was repeated. Of 458 patients so treated, 11 per cent. were cured after one treatment, 16 per cent. after two, 27 per cent. after three, 40 per cent. after four and 98 per cent. after five treatments. In all cases, the patients are kept under observation and the anaemia consequent on the infestation is treated with iron preparations.

H. Harold Scott

GUEVARA, R. **Toxicity of Oil of Chenopodium when administered together with Castor Oil.** *J. Philippine Med. Ass.* 1947, June, v. 23, No. 6, 259–67. [15 refs.]

Oil of chenopodium is a well-recognized anthelmintic : its active principle is ascaridol ; and it is used in the treatment of *Ascaris* and hookworm infections. In ordinary doses it paralyses but does not kill the worms ; it is therefore necessary to follow the administration of this drug by a purgative. It is convenient to give this purgative at the same time as the drug. Castor oil is often used as the purgative. The combined administration is usually looked upon as a safe procedure, but in the Philippines a prejudice has arisen against giving castor oil with oil of chenopodium. It is thought that this is because a popular mixture containing oil of chenopodium and castor oil has given rise to toxic symptoms and in some cases death. There are, however, other ingredients in this mixture.

An investigation was undertaken to prove or disprove the theory that castor oil increases the toxicity of oil of chenopodium. Cats, twenty-seven in all, were used as experimental animals. With a dose of oil of chenopodium of 0·20 ml. per kilogramme, all the cats died ; with a dose of 0·1 ml. all survived ; and with a dose of 0·15 ml. one died and two survived. When 15 ml. of castor oil was added to each dose of oil of chenopodium, all cats survived doses up to 0·30 ml., one out of three survived 0·35 ml. and all three died with doses of 0·40.

The author concludes that the addition of castor oil halves the toxicity of oil of chenopodium rather than increases it, and that, as there are more advantages in taking the combined drugs than each drug separately, this procedure should always be followed.

The symptoms of toxicity were vomiting, general muscular weakness, prostration, ataxia, convulsions, stupor, coma and death, convulsions being the most prominent and lasting several days prior to death. *L. E. Napier*

GUZMAN, F. & MORALES, P. **Ascaris in the Common Bile Duct. (A Report of 10 Cases).** *J. Philippine Med. Ass.* 1946, July, v. 22, No. 7, 299–303.

GALLIARD, H. Evolution de *Wuchereria bancrofti* et *W. malayi* chez *Aëdes* (*Stegomyia*) *aegypti* et *A.* (*S.*) *albopictus*. [**Development of** *Wuchereria bancrofti* **and** *W. malayi* **in** *Aëdes aegypti* **and** *Aëdes albopictus*.] *Ann. Parasit. Humaine et Comparée.* 1947, v. 22, Nos. 1/2, 30–35.

Complete development of *Wuchereria bancrofti* in *Aëdes aegypti* was demonstrated in certain cases, while in others the development was partial only or abortive. Early larval stages only were found in *Aëdes albopictus*.

Complete development of *W. malayi* was observed in a small percentage of cases in both species of mosquitoes. *J. J. C. Buckley*

ROGERS, L. **The Present Position of Antimony Treatment of Filariasis : with a Suggestion for its Intensive Use.** *Indian Med. Gaz.* 1947, June, v. 82, No. 6, 346–8.

Recent work in filariasis at Porto Rico confirms the author's observations made in 1919–1920 regarding the effect of antimony in this infection.

After Christopherson's observations on the effect of sodium antimonyl tartrate in schistosomiasis, the author carried out preliminary investigations at Puri and later at Cuttack jail. In the latter investigation, eight persons with high microfilaria counts, average 73 per 20 cm. [? 20 cmm.], were chosen and treated with sodium antimonyl tartrate with doses up to 5 ml. of a 2 per cent. solution intravenously. In four cases, the microfilaria counts fell steadily for 3 months after the cessation of treatment, reaching 3 to 9 per cent. of their original number, whereas in four others after an early fall in the counts, every month there was a sharp rise which brought the microfilaria curve back to the original level. These peaks were due to the sudden appearance of young embryos, easily distinguished from older forms. The author concluded that, in the first four cases, the adult worms had been killed or very seriously damaged.

These observations were confirmed by DAS in India [1920], DAY in Egypt [*Lancet*, 1921, Mar. 12, 525], ROY & BOSE [*Indian Med. Gaz.*, 1922, v. 57, 281] and BÄR in the Dutch East Indies [no reference]. These workers also showed that the repeated attacks of febrile lymphangitis were eliminated or reduced in frequency, and that in cases of elephantiasis there was a reduction in the diameter of the limbs after 2 to 5 doses of sodium antimonyl tartrate. These observations were not confirmed by the British Guiana Filariasis Commission under Liper [Leiper].

In 1945, Professor Culbertson of New York [CULBERTSON, ROSE & OLIVER-GONZÁLEZ, this *Bulletin*, 1946, v. 43, 354] showed that antimony killed the adult filariae in the pleural cavity of cotton rats, but that the microfilariae continued to circulate in the blood for many months, and that the drug had a similar effect in man if the cases were followed long enough. Some of their cases were followed for 3 years. The best results were obtained with neostibosan, given in intensive doses up to totals of 15 grammes. With small doses of tartar emetic, average total 0·79 grammes, reductions to 41 to 6 per cent. of the original microfilaria counts were obtained.

The author concludes that neostibosan is the drug of choice, but considers that it may prove too expensive in the endemic areas, and suggests that intensive treatment by sodium antimonyl tartrate as used by ALVES & BLAIR [this *Bulletin*, 1946, v. 43, 344] in schistosomiasis, might be as effective in filariasis.

L. E. Napier

RUIZ REYES, F. Tratamiento experimental en la oncocercosis con el "Naphuride Sodium." [**Naphuride Sodium in the Treatment of Onchocerciasis.**] *Medicina*. Mexico. 1947, Oct. 25, v. 27, No. 542, 475–7.

[If more investigators had the courage to report negative results, we would hear less of the success of remedies vaunted on one or two beneficial effects.] The author, at the request of Dr. CULBERTSON of the University of Arkansas, has taken up anew the subject of this drug and its action in onchocerciasis. Naphuride sodium, a product of the Winthrop laboratories, is a synonym of Germanin, Bayer 205, Moranyl, 309 Fourneau and Naganol. The author has tried it in five cases of onchocerciasis of 10–15 years' standing, with abundant embryos in the skin, and two of the patients are blind. Each was given 1 gm. in 10 cc. of doubly distilled water intravenously once a week for five weeks. The weights of the patients ranged between 38 and 50 kgm., and their ages between 16 and 62 years. The drug caused headache, nausea, vomiting and occasionally "severe nephritis," but early examination of the urine (2 days after each dose) forestalled any untoward effects [so says the author, who evidently does not regard severe nephritis as such an effect]. The results on the infestations were controlled by frequent biopsy examinations of the skin to determine whether the embryos were killed by the drug. A table gives the detailed results of the many biopsies and the only conclusion which can be drawn is that "Naphuride Sodium has no obvious effect on onchocerciasis when given by the method described in this article." *H. Harold Scott*

BERTRAM, D. S. **The Period required by *Litomosoides carinii* to reach the Infective Stage in *Liponyssus bacoti*, and the Duration of the Mites' Infectivity.** *Ann. Trop. Med. & Parasit.* 1947, Sept., v. 41, No. 2, 253–61.

Three series of mites were infected and maintained on cotton rats and on white rats by methods previously described. By these methods, the date on which the mites first become infected is known within a limit of twenty-four hours. An account is given of present experiments and the following is the author's summary :—

"It is concluded that white rats and cotton rats which become positive for *L. carinii* after serving as hosts to infected female *L. bacoti* are infected by the transmission of the active thread-like worm larvae which develop in the mites. Transmission appears to occur in association with the feeding habits of the mite, but the actual mode of transmission is not known, and other methods of transmission by the mite cannot be discounted.

"Infected mites stored at 23–25°C. and maintained by blood-meals at approximately five-day intervals first transmit the infection of *L. carinii* to white rat and cotton rat hosts on the occasion of the third meal, or the 15th day, after the mites' infecting meal. Transmission continues until the fifth meal on the 25th day, possibly with diminishing intensity, and it may occur until later than the seventh meal or the 36th day after the mites' infecting meal.

"Of two cotton rats exposed to infection by 17–30 mites of a series in which 38 per cent. were positive, one rat which was exposed for 24 hours on the 15th

day after the mites' infecting meal developed an infection averaging 275 mf./cmm. of peripheral blood (range 90–670 mf./cmm.) in 20 weekly counts ; the other rat which was exposed for 24 hours on the 20th day after the mites' infecting meal developed an infection averaging, over 18 weekly counts, 97 mf./cmm. of peripheral blood (range 40–190 mf./cmm.). A third rat exposed to 3–13 mites of this series on the 25th day of their infection contained only one male *L. carinii*.

" Cotton rats were found to be positive for the microfilariae of *L. carinii* in the peripheral blood-stream 51–54 days after a 24-hour period of exposure to infection by infected mites.

" Non-infective forms of the worm with sickle-shaped tails occur on the ninth and tenth days of the worm's development, and the infective forms appear to be the active thread-like worms varying between 0·5 mm. and 1 mm. in length found from the 14th day to the 36th day after the mites' infecting meal.

" The percentage infection-rates in two series of mites dissected before the first infective meal were as follows : 38 per cent. of 29 mites were positive for 1–5 worms after engorgement on a cotton rat showing 2,584 mf./cmm. of peripheral blood ; 21·8 per cent. of 39 mites were positive for 1–2 worms after engorgement on the same rat on a separate occasion when the blood count was 3,000 mf./cmm. of peripheral blood." *H. S. Leeson*

HAEMATOLOGY

Bichsel, G. Hämoglobinstandardlösung zur Eichung von Hämometern nach " Sahli " und " Zeiss-Ikon ". [**Haemoglobin Standard Solution for the Sahli and Zeiss-Ikon Haemoglobinometers.**] *Schweiz. med. Woch.* 1947, Dec. 13, v. 77, No. 50, 1312–13, 1 diagram. [12 refs.]

Schepers, G. W. H. **Macrocytic Hyperchromic Anaemia on the Witwatersrand. Parts I & II.** *South African Med. J.* 1947, Aug. 9 & 23, v. 21, Nos. 15 & 16, 568–75 ; 605–11, 9 figs. [15 refs.]

On the Witwatersrand, approximately 6,000 feet above sea-level, 300 patients with macrocytic or hyperchromic anaemia were discovered. As there was a potential reservoir of approximately 50,000 persons, the incidence of the anaemia was at least 0·6 per cent., which is considerably in excess of that for pernicious anaemia. A survey suggested that on the Witwatersrand, probably because of the altitude, 5·5 million erythrocytes per cmm. for men and 5 million for women, with corresponding increases in haemoglobin values, should be taken as minimum requirements. Observation showed that the haemoglobin concentration increases as the cell count, but that the rate of increase shows a diphasic, or perhaps tri-phasic trend. Thus, for cell counts between 4 and 5 million per cmm., the rise in haemoglobin is very steep, but above and below these limits the curve shows a deceleration which is progressive as the lower and upper limits are approached. Similarly, it was found that as the cell counts varied from 5 to 3 millions per cmm., the mean cell diameters increased from approximately 6·0 microns to about 10.0 microns, but beyond these limits in either direction the rate of change in cell volume was less than that of the cell count. A curve obtained by plotting the colour index against the mean erythrocyte surface showed no diphasic character, the colour index increasing with increase of cell surface area up to the normal mean of 75 square microns per cell, although beyond this the curve showed an increasing deceleration. In the macrocytic anaemias, the concentration of haemoglobin per unit

area and erythrocyte surface decreased in inverse ratio to the increase in the colour index and the cell surface. The physiological efficiency of such macrocytic cells is thus considerably modified. The macrocytes were grossly hypochromic, many of the larger cells tended to be opaque with a granular appearance, and anisocytosis was always present, often to a marked degree. There was also considerable variation in the leucocyte count, which appeared to be correlated with the degree of associated infections. Many of the patients had some disease of the urinary tract, usually some infection, which the author suggests must almost certainly have some aetiological association with the anaemias, possibly through reflex disturbance of adrenal function and consequent disturbance of " ion balance " across the cell membrane. The patients responded rapidly to parenteral liver therapy, but improvement in the red cell count was in many cases disproportionate to the reticulocyte response, probably owing to correction of an underlying hydraemia. Certain patients presenting symptoms suggestive of anaemia but with apparently satisfactory blood counts, when given anti-anaemic therapy, showed a preliminary fall in the blood count followed by a restoration of the blood level and alleviation of the symptoms ; the author feels, therefore, that the quality of the blood cells as well as the quantitive blood picture is important, and that symptoms of anaemia may be dependent on the proportion of " effete " cells in the blood.

F. Murgatroyd

McSweeney, J. E. J., Mermann, A. C. & Wagley, P. F. **Cold Hemagglutinins in Sickle Cell Anemia.** *Amer. J. Med. Sci.* 1947, Nov., v. 214, No. 5, 542–4.

" The cold agglutinins in a series of 30 cases of sickle cell anemia were determined. Of these cases, 60 per cent. showed a titer of 1 : 40 or over ; 36 per cent. had a titer of 1 : 80 or over. A significant titer could not be correlated with degree of sickling, hemoglobin level, hematocrit, icterus index, the severity of the disease or consistently with the elapse of time since the last crisis."

Das Gupta, C. R. **The Value of Transfusion of Blood in the Treatment of Anaemias.** *Indian Med. Gaz.* 1947, June, v. 82, No. 6, 313–20, 14 graphs.

The majority of deficiency anaemias respond satisfactorily to haematinics alone ; also anaemias associated with infection or infestation, such as those due to malaria, kala azar or hookworm disease, similarly respond when the infection or infestation is treated by specific drugs. Transfusion of blood is a valuable adjunct in the treatment of any severe anaemia with hypocellular bone marrow, and in refractory anaemias where appropriate haematinics or specific drugs do not produce satisfactory response ; but transfusion alone will seldom, if ever, effect a cure in the absence of appropriate haematinic or specific therapy. Transfusion is of value as supporting treatment in cases of essential thrombocytopenia and chronic myeloid leukaemia, and is of temporary value in cases of Cooley's and von Jaksch's anaemias. Transfusions are of doubtful value in aplastic anaemia, excepting where the aplasia is temporarily produced by some severe infection amenable to specific treatment. *F. Murgatroyd*

VENOMS AND ANTIVENENES

GRASSET, E. & CHRISTENSEN, P. A. **Enzyme-Purification of Polyvalent Antivenene against Southern and Equatorial African Colubrine and Viperine Venoms.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1947, Oct., v. 41, No. 2, 207–11.

"Enzyme-purification of polyvalent South African *Naja flava-Bitis arietans* antivenine, and polyvalent *Bitis gabonica* antivenene, resulted in from four to six times concentration, and an increase in nitrogen content to approximately double the original amount. Group neutralizing antibodies against other African colubrine venoms, namely, *N. melanoleuca*, *N. haje*, *N. nigricollis*, *Sepedon haemachates*, and *Dendraspis angusticeps*, were concentrated to useful therapeutic levels. Limited protection was observed against the venom of *Bitis nasicornis*. The speed of union between enzyme-treated antivenene and venom is high.

The increased antibody concentration and purity of enzyme-treated antivenene marks a big therapeutic advance in the treatment of snake-bite, as compared with the antivenene previously prepared by fractional sodium sulphate precipitation, and its use reduces the risk of serum reactions."

EICHBAUM, F. W. **A Dilution-Phenomenon in the Titration of Antivenins (Antibothropic Sera).** *J. Immunology.* 1947, Oct., v. 57, No. 2, 101–14, 6 graphs.

DERMATOLOGY AND FUNGUS DISEASES

WILLIAMS, W. **The Tropical Lichen Planus Syndrome.** *Brit. Med. J.* 1947, Dec. 6, 901–4, 2 figs.

The author describes in detail three cases, and discusses a possible fourth case of this condition, the incidence of which was estimated at 1/2,000 troops. All were members of a New Zealand force operating in the Solomon Islands, a highly malarious region where suppressive mepacrine was administered to all troops at a rate of 0·1 gm. daily for six days in each week.

The patients, two white soldiers and a quarter-caste Maori, had been taking suppressive mepacrine for eight to twelve weeks before the first symptoms developed, and in all cases it was noted that fresh lesions appeared while mepacrine was being taken, but ceased soon after its discontinuance.

The disease began as a patchy hyperkeratosis of the palms and soles, accompanied by thickening of the finger and toe nails, which became brittle and opaque. Later a rash developed on the trunk and limbs which consisted in two cases of pink macules up to ½ inch in diameter, and in the third of raised bluish purple areas some of which were an inch in diameter. In two cases, lesions suggestive of syphilitic mucous patches developed on the buccal mucosa.

As the disease progressed, scaling occurred on the individual lesions and a variable degree of follicular hyperkeratosis developed on the back and shoulders.

The disease took a course of six to twelve months, during which the thickened skin of the palms and soles was shed, and pigmentation occurred on the original patches. In some areas, vitiligo replaced the original pigmentation, and this variegated pattern appeared to be permanent. There was marked atrophy of the skin at the site of some of the healed lesions. Throughout the course of the disease the general health remained good. No evidence of spirochaetal or mycotic infection was found in any case, nor was the author able to transmit the disease by inoculation of a volunteer with serum from scarified lesions.

The cases were therefore regarded as examples of tropical lichen planus, a condition which appears to be related to the use of mepacrine as a malaria suppressive. *H. T. H. Wilson*

Kułowski, J. & Stovall, S. **Maduramycosis of Tibia in a Native American.** *J. Amer. Med. Ass.* 1947, Oct. 18, v. 135, No. 7, 429–32, 3 figs. [Refs. in footnotes.]

Calero, C. Cromoblastomicosis. Acción *in vitro* de las sulfas sobre tres razas fungosas encontradas en el Istmo de Panama. [**Action *in vitro* of Sulphonamides on Three Strains of *Fonsecaea pedrosoi* in the Isthmus of Panama.**] *Rev. Inst. Salubridad y Enfermedades Trop.* Mexico. 1947, June, v. 8, No. 2, 119–23.

The English summary appended to the paper is as follows :—

" In accordance with our observations ' in vitro,' in regard to the effects of four sulphonamides on the growth of three Panamanian strains of *Fonsecaea pedrosoi*, the sulphapyridine seems to produce the most notable inhibitory effects.

" Our observations also seem to indicate that these drugs have a certain inhibitory effect on the sporulation of fungi studied, the effect particularly notable on phialophoric type of sporulation ; less effective on acrotheca sporulation ; and much less notable on hormodendrum type of sporulation.

" The study ' in vitro ' on the four kinds of sulphonamides used in the growth of the three pathogenic strains of *Fonsecaea pedrosoi* (Brumpt) Negroni, 1936, encountered on the Isthmus of Panama, ratifies the observation ' in vitro ' already reported by Pardo Castelló *et al.* (1942)."

Forbus, W. D. & Bestebreurtje, Annie M. **Coccidioidomycosis : a Study of 95 Cases of the Disseminated Type with special reference to the Pathogenesis of the Disease.** *Milit. Surgeon.* 1946, Nov., v. 99, No. 5, 653–719, 37 figs. (4 coloured). [236 refs.]

This long and masterly description of the clinical and pathological features of coccidioidomycosis, which should be read in the original, is based on the study of materials obtained by biopsy and by necropsy from 95 cases of the disease in its disseminated form, supported by the clinical and pathological records.

Following the method used in the classification of pulmonary tuberculosis, the authors distinguish two stages of coccidioidomycosis ; (1) a primary complex which may be symptomatic or asymptomatic, and (2) an endogenous reinfection leading to disseminated disease. Hitherto, little was known of the pathology of the primary, pulmonary stage of coccidioidomycosis, in which death rarely occurs, but the authors " have been able to construct, according to well-established pathologic principles, the probable pulmonary reactions to the primary infection with *Coccidioides immitis*," and they recognize four forms of the pulmonary lesion : (*a*) Lobular, focal, pulmonary consolidation strongly resembling the ordinary type of bacterial pneumonia ; (*b*) extensive, gelatinous, focal or confluent, or lobular consolidation ; (*c*) necrotizing, ulcerative bronchitis and bronchiolitis with bronchiectasis and bronchiectatic cavity formation ; and (*d*) focal lobular or massive lobar, indurated, grey, moist, granulomatous consolidation. In its milder forms, the primary disease usually resolves without leaving any permanent change in the lung tissue, but the suppurative and the granulomatous, necrotizing lesions heal with scar formation. It is noteworthy that the authors found calcification of these lesions

to be far from common, despite the widely held view that primary coccidioidomycosis is a frequent cause of pulmonary calcification in the endemic regions.

The reinfection or disseminated stage of the disease may involve any organ or tissue of the body ; those commonly affected being the lungs, lymph nodes, bones, meninges and the skin and subcutaneous tissues. The pathology of this stage of the disease is well known. Autogenous reinfection may be brought about by intrapulmonary or extrapulmonary bronchial ulceration from the lymph nodes, with aspiration of the infective material, or by vascular dissemination from various sources, and the authors consider that this may take place at any time up to about ten years after recovery from the primary stage. Approximately 6,000 cases of primary coccidioidomycosis were identified clinically in the U.S. Armed Forces during the war period and, presumably, the subclinical or unidentified cases greatly exceed this number, so, for some time to come, cases of granulomatous coccidioidomycosis may be expected to develop in previously infected persons who may have moved to places remote from the endemic areas of the disease.

A fully documented history of the disease, in yearly periods, from its discovery by Wernicke in 1892, to 1945, is a valuable feature of this important work, which is completed by a bibliography of 236 titles. *J. T. Duncan*

González Ochoa, A. & Soto Figueroa, Eva. Polisacaridos del *Sporotrichum schenckii*. Datos inmunológicos. Intradermo-reacción en el diagnóstico de la esporotricosis. [**Polysaccharides of** *S. schenckii* ; **the Intradermal Reaction in the Diagnosis of Sporotrichosis.**] *Rev. Inst. Salubridad y Enfermedades Trop.* Mexico. 1947, June, v. 8, No. 2, 143–53.

The English summary appended to the paper is as follows :—

" From cultures of *Sporotrichum schenckii* were obtained two substances of carbohydrate nature, one from the culture film and one from the culture liquid. These carbohydrates are precipitated by homologous and heterologous immune rabbit serum and from human cases of sporotrichosis ; they are not antigenic or toxic, and the skin test performed with said substances seems of value for diagnosis of sporotrichosis."

HEAT STROKE AND ALLIED CONDITIONS

Critchley, M. **Effects of Climatic Extremes.** *Brit. J. Indust. Med.* 1947, July, v. 4, No. 3, 164–90. [58 refs.]

This paper is a comprehensive review of the effects of climate on men, and it includes references to some of the researches carried out during the war years. Methods of measuring environmental warmth are described, and the conditions compatible with thermal comfort are summarized. There are sections dealing with working efficiency in hot and in cold environments, with physiological responses to heat and cold, and with acclimatization. Relatively little is known about acclimatization to cold. The effects of prolonged exposure to heat on physiological reactions and morbidity, and the psychological effects of tropical residence, are discussed, and further sections deal with such effects of cold climates, and with the effects of sudden change from one climatic extreme to another.

For the successful habitation of regions with difficult climates, careful selection of persons suited for such climates and rejection of the unsuitable

should be profitable. The bases of such selection and rejection are discussed. In considering protection against extremes of heat, clothing, housing, food and drink, hours of work, leave, exercise, air-conditioning, and protection against solar radiation, are all important, and these are discussed in the final sections of the paper.

[Unfortunate errors occur on page 166 of the paper. A formula relating to the globe thermometer has been badly confused, and later it is said that "equivalent warmth" is measured by the "eupathcoscope." Equivalent warmth is computed from other instrumental measurements. The *eupatheoscope* is used for the measurement of equivalent temperature, which is not the same as equivalent warmth.] *Thomas Bedford*

i. WATERLOW, J. C. **Heat-Stroke and Heat-Exhaustion in Iraq.** *Brit. Med. Bull.* 1947, v. 5, No. 1, 3–4.

ii. LADELL, W. S. S. **Effects on Man of High Temperatures. With special reference to the Work of the Heat Physiology Team at the National Hospital.** *Ibid.* 5–8, 6 figs.

iii. ——. **Effects on Man of Restricted Water-Supply.** *Ibid.* 9–13, 6 figs.

iv. ELLIS, F. P. **Effects of a Tropical Climate on Men in Warships.** *Ibid.* 13–19, 5 figs.

v. WEINER, J. S. **Biological Assessment of Clothing for Tropical Service Use.** *Ibid.* 20–24. [11 refs.]

These papers summarize some of the results obtained by Medical Research Council workers during the war, in studies of the effects of tropical conditions on persons in military and naval service. It is remarked in a preamble that in referring to men and women as "personnel" they are considered not as individuals but as interdependent working units in a larger organization. The healthy subject is studied in relation to his fitness to perform particular duties.

i. Waterlow reports on the findings of himself and Ladell in a physiological and biochemical study of heat-stroke and heat-exhaustion in Iraq during 1943 [see this *Bulletin*, 1945, v. 42, 143]. The few cases of heat-stroke that occurred in the summer of 1943 conformed to the classical description. Usually, the patient had suddenly stopped sweating, and the sudden and complete stoppage of sweating suggested a breakdown in the central mechanism for heat regulation. The cause of the breakdown could not be established—such biochemical changes as were found appeared to be secondary, and gave no indication of the cause of the breakdown. Over-exposure to the sun, and overwork, precipitate the onset of heat-stroke, but are clearly not the only causes.

Two types of heat-exhaustion are discussed. Type 1 is sometimes called "heat-shock." Patients suffered from collapse, vomiting and cramps. Neither the pulse rate nor the systolic pressure was a useful sign with this type of heat-exhaustion. A better guide was the diastolic pressure, a high diastolic pressure being a bad sign. Biochemical examinations gave a picture of dehydration secondary to lack of salt, rather than to lack of water. It seemed that the casualties were the direct result of heat, but that some men were predisposed to this type of heat-exhaustion through having a high salt-concentration in their sweat. In the second type of heat-exhaustion, symptoms predominated over signs. There were dizziness, palpitation, dyspnoea, lack of sleep, and complaints of inadequate sweating. The symptoms were usually worse in the heat of the day. In many cases, prickly heat had been experienced three or four weeks earlier, and this condition was constantly present in type 2 heat-exhaustion. It seemed likely that the failure of sweating in

this type of heat-exhaustion was due to local causes. Australian Army physicians described a similar syndrome in which, by means of serial sections of skin, they found blocking of the superficial parts of the sweat ducts and cystic dilatation of the ducts beneath the block. Polyuria was marked in this syndrome. Heat-exhaustion type 2 does not endanger life ; no case developed into heat-stroke. Yet it was of military importance, because the incidence was high and the rate of recovery slow.

ii. Work done by the Heat Physiology Team at the National Hospital, London, on the effects of high temperatures on man, is described by Ladell. With acclimatization to heat sweating starts at a lower rectal temperature, and later reaches a higher rate for a given rectal temperature. At the same time the cardiovascular system becomes adjusted, probably because of an increase in the plasma-volume. Men are apparently physically efficient, and able to continue work for periods up to two hours, with rectal temperatures of 102°F., but in the light of observation and personal experience 101°F. was taken as the acceptable upper limit. The sweat glands appear to become fatigued rapidly at high rates of secretion. The decline of sweating after a certain length of time occurs whether the subject is replacing his water (and salt) losses or not.

The points considered in deciding whether the given environment should be regarded as tolerable or not were : (i) whether one or more subjects in the group failed to stay the course for four hours ; (ii) a final rectal temperature (after work) above 101°F. ; (iii) an average sweat-rate over the whole period of more than 1,250 cc. per hour ; and a final (after work) pulse-rate of more than 140 per minute. By the use of these criteria, contour lines showing limiting environments were drawn. Of interest and importance is the notable effect of low air speeds. Thus, for men working in shorts, an increase in air speed of from 10 to 25 ft. per min. raised the wet-bulb tolerance by 1°F. at high humidities and by 2°F. at low ones. It increased the dry-bulb tolerance by 5°F. and 10°F. at high and low humidities respectively. Increase of air movement from 75 to 200 ft. per min. increased the wet-bulb tolerance by only 1°F., and the dry bulb tolerance by 10°F. at all humidities.

iii. In a further paper, Ladell describes an experimental study of the effects on man of restricted water-supply. The work was done on behalf of the Committee for the Care of Shipwrecked Personnel. When little or no water is taken, there is a rapid fall in body-weight, because of the cumulative water-debt contracted within the body. In a temperate climate, a water intake of 800 to 900 cc. per day was needed to maintain water balance. Physical deterioration ran parallel with weight loss. A 5 per cent. loss was tolerable, but with 10 per cent. loss, such as occurred after 60 hours' deprivation, gross deterioration, physical and mental, began to set in. Some constituents of lifeboat rations had a diuretic effect, and proposals were made for amended rations. Measures for increasing the water supply in lifeboats were explored. Diuresis is caused by the drinking of sea-water, but with intakes of less than 400 cc. per day the increase in urine volume is less than the volume of sea-water drunk, so that there is a net gain of water to the body. Higher intakes of sea-water cause a drain on body water, hence larger amounts of sea-water are dangerous. Water requirements are high in the tropics, and water deprivation very quickly causes dehydration. Thirst is a poor index of the need for water, and it was recommended that each man should drink enough to produce " at least a beer-bottle and a half " (about 850 cc.) of urine each day.

iv. The effects of a tropical climate on men in warships are discussed by Ellis. A Sub-committee of the Royal Naval Personnel Research Committee recommended that an effective temperature of 80°F. was the upper desirable limit for working and living compartments in ships, while 86°F. was the upper acceptable limit. The average thermal conditions in eleven ships with the

Eastern Fleet in 1944 are tabulated. In each type of compartment listed, the average effective temperature exceeded the upper desirable limit, and in most of them the upper acceptable limit was exceeded. Sickness rates, and causes of sickness, in 28 ships and 6 naval shore establishments are discussed. Prickly heat was very prevalent, and affected 80 to 90 per cent. of the men at one time or another. Excluding prickly heat, 9 per cent. of the men in operational ships reported every month with skin trouble. Studies of the effects of heat on the efficiency of wireless operators, carried out by Mackworth, are summarized. Efficiency declined when the effective temperature was between 83° and 87·5°F., and at higher temperatures the decline was rapid. It is noted that the average effective temperatures observed in wireless and radar offices in the Eastern Fleet were about 86° and 87°F., respectively.

v. Weiner discusses the biological assessment of clothing for use in tropical service. For most military purposes, the thermal study of clothing is reduced to a few easily-measurable criteria—rectal temperature, pulse-rate, sweat-output, water regain by clothing, and, where possible, the evaporated and un-evaporated fractions of the sweat-loss of the subject. It is important that subjects shall be fully acclimatized before clothing tests are begun. In examining fabrics for mosquito-proofness, main reliance was placed on a test in which an arm, covered with the fabric, was exposed to the bites of 200 starved *Aëdes aegypti*. The number of weals in 15 minutes was noted.

The physical characteristics of clothing fabrics relevant to performance in the tropics are the thickness, weight per unit area, water-vapour resistance (" ventility "), air permeability, water absorption and drying-out, and the construction of the cloth. Fabrics for special service garments were studied.

Thomas Bedford

TROPICAL ULCER

Sternfeld, J. & Hirsch, W. **Ulcus Tropicum. Clinical and Bacteriological Description of its Epidemic Occurrence in Haifa, 1944.** *Harefuah.* Jerusalem. 1947, Nov. 16. v. 33, No. 10. [In Hebrew 157–62, 5 figs. & 1 graph. English summary 162.]

In the first half of 1944, 7 cases of classical tropical ulcer occurred in Haifa among immigrants from the Yemen. In the summer, an epidemic of 122 cases occurred among the local Jewish population. The two forms differed: the ulcers of the Yemenites were typical chronic tropical ulcers of a severe form, and 5 of them showed spirochaetes as well as fusiform organisms. The epidemic ulcers were mild, without general symptoms, easily cured and spirochaetes were found in only 5 of the 122. (Nevertheless, spirochaetes were also absent from 2 of the 7 Yemenite cases.)

Although the presence of spirochaetes seems to increase the virulence of tropical ulcers, the authors believe that it is not necessary to their development. The characteristic microbiological finding is that of fusiform bacteria, with or without other organisms. Severity depends largely on the patients' general health and nutritional state, on clothing and on climate. Up to the present, tropical ulcer has been rare in Palestine and has occurred only in epidemics initiated, it is claimed, by the arrival of Yemenite immigrants: but it is not thought that, even if it became endemic in Palestine, it would acquire the severe character so commonly encountered in the tropics, so long as the conditions for its malignant development do not exist in the local population. [What those conditions are is not indicated in the summary, apart from the general factors mentioned above, which are somewhat vague.]

H. J. O'D. Burke-Gaffney

ENTOMOLOGY AND INSECTICIDES: GENERAL

v. JETTMAR, H. M. Mikrobien als Feinde von Stechmückenlarven. [**Micro-Organisms as Enemies of Mosquito Larvae.**] *Acta Tropica*. Basle. 1947, v. 4, No. 3, 193–209, 2 figs. [57 refs.]

The author describes a fatal invasion by streptobacilli of the larvae of *Culex fatigans* in Shanghai, in the summer of 1946: the larvae were also secondarily invaded by vorticella which covered them in a thick layer. The mortality of the larvae was 100 per cent. The pond where this phenomenon occurred proved to be an excellent trap for female *C. fatigans*, which deposited eggs from which emerging larvae were duly destroyed by the streptobacilli. The paper is illustrated with two photomicrographs. *H. J. O'D. Burke-Gaffney*

CHAMBOST, L. & HOUDEMER, E. Capture de *Phlebotomus perniciosus* Newst-1911 à Ajaccio (Corse). [**Presence of *Phlebotomus perniciosus* in Ajaccio (Corsica).**] *Bull. Soc. Path. Exot.* 1947, v. 40, Nos. 9/10, 361–2.

WHITNALL, A. B. M. & BRADFORD, B. **An Arsenic-Resistant Tick and its Control with Gammexane Dips.** *Bull. Entom. Res.* 1947, Aug., v. 38, Pt. 2, 353–72, 1 fig. & 2 pls. [15 refs.]

During the past thirty years, at least seven species of pest insects have developed strains unduly difficult to kill by insecticides in routine use. This appears to have happened in South Africa, where the tick *Boophilus decoloratus* Koch, has, in many areas, become resistant to the regular arsenical dipping treatment.

A laboratory procedure is described whereby the ticks can be subjected to different concentrations of dips under standard conditions; adult females, collected from infested animals, were used for most of the tests. These experiments confirmed the existence of arsenic-resistant ticks in certain areas; the degree of resistance varied in different places. In a search for insecticides which would meet the difficulty, *gamma* B.H.C. (benzene hexachloride) was found to be outstanding. The following concentrations were required to give 50 per cent. control in the dip tests (resistant ticks): *gamma* B.H.C., 0·0007 per cent.; arsenous oxide, 0·32 per cent.; DDT, 0·4 per cent.; nicotine, over 0·8 per cent.; rotenone over 0·1 per cent. Dust preparations of *gamma* B.H.C. were slightly less effective than the liquid ones. *J. R. Busvine*

BARLOW, F. **Determination of Benzene Hexachloride in the Blood of Cattle.** [Correspondence.] *Nature*. 1947, Nov. 22, 719–20.

Recent experiments have shown that Gammexane and DDT orally ingested by mammals may prove toxic to insects subsequently feeding on them [GARNHAM, this *Bulletin*, 1948, v. 45, 121]. Therefore, it would be of interest to determine chemically the amount present in the blood. Blood from cattle dosed with Gammexane was oxalated, ground with anhydrous sodium sulphate and extracted with benzene. The gammexane believed to be present was de-hydrochlorinated and estimated by chloride determination. It was found that after a dose of 0·25 gm. per kgm., about 1 or 2 mgm. of gammexane appeared to be present in each 100 cc. of blood for one or two days. After four similar doses, the same amounts were present for up to a month after dosing.

One test was made with a calf sprayed with an oil solution of gammexane (about 40 mgm. per square foot). After a short lag of 2–3 days, about 2 mgm. gammexane per 100 cc. of blood were detected. This disappeared after five days. *J. R. Busvine*

Thorp, J. M. & de Meillon, B. **Inhibition of the Toxicity of " Gammexane " for Insects.** [Correspondence.] *Nature*. 1947, Aug. 23, 264–5, 1 graph.

REPORTS, SURVEYS AND MISCELLANEOUS PAPERS

Rockefeller Foundation. International Health Division. **Annual Report 1946**. pp. ix+239, 14 figs. on 7 pls. New York : 49 West 49th Street.

The report for 1946 maintains the same attractive format, and the same easy and interesting style, as its predecessors. The bulk of work done during the year relates to yellow fever in S. America and Africa ; malaria studies in relation to chemotherapy, and to control in many parts of the world ; influenza and other respiratory diseases ; rickettsial diseases ; nutritional diseases ; virus studies ; and syphilis, diphtheria, tuberculosis and certain other subjects. There are also sections dealing with aid to state and local health services, health care, and public health education. At the end is a statement of expenditure each year since 1940, and for the period 1913–1939.

Most of the work published by the members of the staff of the International Health Division has been reviewed in the *Tropical Diseases Bulletin* or the *Bulletin of Hygiene*, but in the short compass of this report the reader will find interesting consecutive accounts of these researches, which will give him a clear idea of their scope. *Charles Wilcocks*

BOOK REVIEWS

Hegh, E. [Ingénieur Agronome, Lauréat de l'Institut de France, etc.] **Les tsé-tsés. Description—biologie—moyens de destruction.** [Tsetse Flies : their Morphology and Biology and the means of destroying them.] 115 pp., 29 figs. 1946. Brussels : Ministère des Colonies : Direction Générale de l'Agriculture et de l'Elevage, Place Royale, 7.

This book is a useful introduction to the subject of tsetse flies in general and to those of the Belgian Congo in particular. It admirably suits the requirements of the newcomer to the subject, whether medically interested or not. More advanced work is referred to in the text and the author lists some of his own publications at the end ; otherwise there is no bibliography. There is no index in the ordinary sense, but the table of contents is so comprehensive that it serves the purpose. Illustrations of tsetse anatomy and of breeding-places have been collected from well-known sources.

It is surprising how much the author has managed to get into so little space. He begins by explaining the importance of his subject and gives some notes on the history of the study of *Glossina* and trypanosomiasis. From this, he proceeds to describe how tsetse flies may be recognized and distinguished from other flies. This leads on to descriptions of anatomy and to classification. Reproduction is next dealt with, followed by descriptions of the larva and the pupa. Many aspects of bionomics are touched on and their importance is discussed, such as seasonal movements of the fly, relation to game and domestic animals, climate and feeding habits. Notes are given on the characters of groups and species of *Glossina* as found in the Congo ; other species are briefly noted. The book closes with accounts of some natural enemies, parasites and

predators of adult and pupa and with methods of control, including bush-clearing, eradication of game, systematic trapping and the treatment of cattle. Finally, there are a few words about the future possibilities of DDT and Gammexane in the control of *Glossina* when these are applied to animals in the open or in stables, or used in whitewash or in cattle dips.

In the appendices are keys for the identification of tsetse flies in groups of species and as separate species, both as adults and as pupae. *H. S. Leeson*

GELFAND, Michael [M.B. (Cape Town), M.R.C.P., Govt. Med. Officer, Salisbury Native Hospital, Southern Rhodesia]. **African Medical Handbook. An Outline of Medicine and Hospital Practice for African Nurses, Orderlies and Medical Assistants.** 202 pp., 22 figs. 1947. Cape Town: The African Bookman. [15*s.*]

The fact that another *vade mecum* for African subordinate medical staff has been produced is a welcome sign of the increasing recognition of the need for adequate training of this class of worker in the Colonies and in Southern Africa.

Unfortunately, as the author points out in his preface, there is little uniformity in the designation, status, responsibility and functions of these men and women in the various dependencies. Inevitably, therefore. the length and type of training vary according to whether they are destined to serve as nurses, first-aid workers, orderlies, dressers, dispensers, public health inspectors or medical assistants.

It follows that there is a demand for a variety of text-books with slightly differing approach and content. This one appears to be a combination of a nurse's manual and a general synopsis. It would appear to be more suited to the nursing orderly, for one is constantly reminded that this or that condition or treatment is to be referred to the doctor. There is no section on clinical pathology nor on dispensing, both of which would be needed by a worker in charge of a dispensary.

The matter is arranged in 14 chapters, under systemic heads including three topical chapters on Disorders of Nutrition, Tropical Diseases, and Infectious Diseases. The author encounters the usual difficulties in getting things to fit this scheme, *e.g.*, yaws is dealt with under tropical diseases, while tetanus is among the infectious diseases. Scabies is raised to the dignity of a tropical disease. A chapter on skin diseases would have been an advantage from many points of view. Salpingitis and ectopic pregnancy are shown under "The Alimentary Tract."

Diagrams are original, but not too easy to follow, as one must start reading life cycles from the bottom up if one is to work from the known to the unknown, the best tutorial method for backward folk.

Apart from these minor criticisms, the matter is well and clearly set forth on orthodox lines. There are few mistakes ("morbillis" for morbilli being one) and the printing is good. It is a pity that the price has to be 15*s.* for 200 pages, but the handbook will undoubtedly be popular among those for whom it is intended. *C. C. Chesterman*

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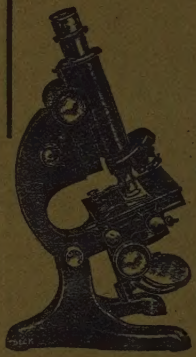

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